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THE MONIST

SPACE AND GEOMETRY FROM THE POINT OF VIEW OF PHYSICAL INQUIRY.[1]

I.

OUR notions of space are rooted in our *physiological* constitution. Geometric concepts are the product of the idealisation of *physical* experiences of space. Systems of geometry, finally, originate in the logical classification of the conceptual materials so gathered. All three factors have left their indubitable traces in modern geometry. Epistemological inquiries regarding space and geometry accordingly concern the physiologist, the psychologist, the physicist, the mathematician, the philosopher, and the logician alike, and they can be gradually carried to their definitive solution only by the consideration of the widely disparate points of view which are here offered.

Awakening in early youth to full consciousness, we find ourselves in possession of the notion of a *space* surrounding and encompassing our body, in which space move various *bodies*, partly altering and partly retaining their size and shape. It is impossible for us to ascertain how this notion has been begotten. Only the most thoroughgoing analysis of experiments purposefully and me-

[1] The present article is intended to supplement the two preceding papers which I wrote on similar subjects in *The Monist*, Vol. XI., page 321, and Vol. XII., page 481. I am endeavoring in this essay to define my attitude as a physicist toward the subject of metageometry so called. Detailed geometric developments will have to be sought in the sources. I trust, however, that by the employment of illustrations which are familiar to every one I have made my expositions as popular as the subject permitted. [Translated from Professor Mach's manuscript by T. J. McCormack.]

thodically planned has enabled us to conjecture that inborn idiosyncracies of the body have coöperated to this end with simple and crude experiences of a purely physical character.

An object seen or touched is distinguished not only by a *sensational quality* (as "red," "rough," "cold," etc.), but also by a *locative quality* (as "to the left," "above," "before," etc.). The sensational quality may remain the same, while the locative quality continuously changes; that is, the same sensuous object may move in space. Phenomena of this kind being again and again induced by physico-physiological circumstances, it is found that however varied the accidental sensational qualities may be, the same order of locative qualities invariably occurs, so that the latter appear perforce as a fixed and permanent system or register in which the sensational qualities are entered and classified. Now, although these qualities of sensation and locality can be excited only in conjunction with one another, and can make their appearance only concomitantly, the impression nevertheless easily arises that the more familiar system of locative qualities is given antecedently to the sensational qualities (Kant).

Extended objects of vision and of touch consist of more or less distinguishable sensational qualities, conjoined with adjacent distinguishable, continuously graduated locative qualities. If such objects move, particularly in the domain of our hands, we perceive them to shrink or swell (in whole or in part), or we perceive them to remain the same; in other words, the contrasts characterising their bounding locative qualities change or remain constant. In the latter instance, we call the objects rigid. By the recognition of permanency as coincident with spatial displacement, the various constituents of our intuition of space are rendered *comparable* with one another,—at first in the *physiological* sense. By the comparison of different bodies with one another, by the introduction of *physical* measures, this comparability is rendered quantitative and more exact, and so transcends the limitations of individuality. Thus, in the place of an individual and non-transmittable intuition of space are substituted the universal concepts of geometry, which hold good for all men. Each person has his own individual intuitive

space; geometric space is common to all. Between the space of intuition and *metric* space, which contains physical experiences, we must sharply distinguish.

II.

The need of a thoroughgoing epistemological elucidation of the foundations of geometry induced Riemann,[1] about the middle of the century just closed, to propound the question of the nature of space; the attention of Gauss, Lobachévski, and Bolyai having before been drawn to the empirically hypothetical character of certain of the fundamental assumptions of geometry. In characterising space as a special case of a multiply-extended "magnitude," Riemann had doubtless in mind certain geometric constructs which may similarly be imagined to fill all space,—for example, the system of Cartesian co-ordinates. Riemann further asserts that "the propositions of geometry cannot be deduced from general conceptions of magnitude, but that the peculiar properties by which space is distinguished from other conceivable triply-extended magnitudes can be derived from experience only.... These facts, like all facts, are in no wise necessary, but possess empirical certitude only,—they are hypotheses." Like the fundamental assumptions of every natural science, so also, on Riemann's theory, the fundamental assumptions of geometry, to which experience has led us, are merely *idealisations* of experience.

In this physical conception of geometry, Riemann takes his stand on the same ground as his master Gauss, who once expressed the conviction that it was impossible to establish the foundations of geometry entirely *a priori*,[2] and who further asserted that "we must in humility confess that if number is exclusively a product of the mind, space possesses in addition a reality outside of our mind, of which reality we cannot fully dictate *a priori* the laws.[3]

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[1] *Ueber die Hypothesen, welche der Geometrie zu Grunde liegen.* Göttingen, 1867.

[2] *Brief von Gauss an Bessel*, 27. Januar 1829.

[3] *Brief von Gauss an Bessel*, 9. April 1830.—The phrase "Number is a product or creation of the mind" has since been repeatedly used by mathematicians.

Every inquirer knows that the knowledge of an object he is investigating is materially augmented by *comparing* it with related objects. Quite naturally therefore Riemann looks about him for objects which offer some analogy to space. Geometric space is defined by him as a triply-extended continuous manifold, the elements of which are the points determined by every possible three co-ordinate values. He finds that "the places of objects of sense and colors are probably the only concepts [*sic*] whose modes of determination form a multiply-extended manifold." To this analogy others were added by Riemann's successors and elaborated by them, but not always, I think, felicitously.[1]

Comparing *sensation* of space with *sensation* of color, we discover that to the continuous series "above and below," "right and left," "near and far," correspond the three sensational series of mixed colors, black-white, red-green, blue-yellow. The system of sensed (seen) places is a triple continuous manifold like the system of color-sensations. The objection which is raised against this analogy, viz., that in the first instance the three variations (dimensions) are homogeneous and interchangeable with one another, while in the second instance they are heterogeneous and not interchangeable, does not hold when space-*sensation* is compared with color-*sensation*. For from the psycho-physiological point of view "right and left" as little permit of being interchanged with "above and below" as do red and green with black and white. It is only when we compare *geometric* space with the system of colors that the objection is apparently justified. But there is still a great deal lacking to the establishment of a complete analogy between the space of intuition and the system of color-sensation. Whereas

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Unbiassed psychological observation informs us, however, that the formation of the concept of number is just as much initiated by experience as the formation of geometric concepts. We must at least know that virtually *equivalent* objects exist in multiple and unalterable form before concepts of number can originate. Experiments in counting also play an important part in the development of arithmetic.

[1] When acoustic pitch, intensity, and *timbre*, when chromatic tone, saturation, and luminous intensity are proposed as analogies of the three dimensions of space, few persons will be satisfied. *Timbre*, like chromatic tone, is dependent on several variables. Hence, if the analogy has any meaning whatever, several dimensions will be found to correspond to *timbre* and chromatic tone.

nearly equal distances in sensuous space are immediately recognised as such, a like remark cannot be made of differences of colors, and in this latter province it is not possible to compare physiologically the different portions with one another. And, furthermore, even if there be no difficulty, by resorting to physical experience, in characterising every color of a system by three numbers, just as the places of geometric space are characterised, and so in creating a metric system similar to the latter, it will nevertheless be difficult to find something which corresponds to distance or volume and which has an analogous physical significance for the system of colors.

There is always an *arbitrary* element in analogies, for they are concerned with the coincidences to which the attention is directed. But between space and time doubtless the analogy is fully conceded, whether we use the word in its physiological or its physical sense. In both meanings of the term, space is a triple, and time a simple, continuous manifold. A physical event, precisely determined by its conditions, of moderate, not too long or too short duration, seems to us physiologically *now and at any other time* as having the same duration. Physical events which at any time are temporarily coincident are likewise temporarily coincident at any other time. Temporal congruence exists, therefore, just as much as does spatial congruence. Unalterable physical temporal objects exist, therefore, as much as unalterable physical spatial objects (rigid bodies). There is not only spatial but there is also temporal substantiality. Galileo employed corporeal phenomena, like the beats of the pulse and breathing, for the determination of time, just as anciently the hands and the feet were employed for the estimation of space.

The simple manifold of *tonal sensations* is likewise analogous to the triple manifold of space-sensations.[1] The comparability of the different parts of the system of tonal sensations is given by the possibility of directly sensing the musical *interval.* A metric

[1] My attention was drawn to this analogy in 1863 by my study of the organ of hearing, and I have since then further developed the subject. See my *Analysis of the Sensations*, etc.

system corresponding to geometric space is most easily obtained by expressing tonal pitch in terms of the logarithm of the rate of vibration. For the constant musical interval we have here the expression,

$$\log \frac{n'}{n} = \log n' - \log n = \log \tau - \log \tau' = \text{const.},$$

where n', n denote the rates, and τ', τ the periods of vibration of the higher and the lower note respectively. The difference between the logarithms here represents the constancy of the length on displacement. The unalterable, substantial physical object which we sense as an interval is for the ear *temporally* determined, whereas the analogous object for the senses of sight and touch is spatially determined. Spatial measure seems to us simpler solely because we have chosen for the fundamental measure of geometry distance *itself*, which remains unalterable for sensation, whereas in the province of tones we have reached our measure only by a long and circuitous physical route.

Having dwelt on the coincidences of our analogised constructs, it now remains for us to emphasise their *differences*. Conceiving time and space as sensational manifolds, the objects whose motions are made perceptible by the alteration of temporal and spatial qualities are characterised by other sensational qualities, as colors, tactual sensations, tones, etc. If the system of tonal sensations is regarded as analogous to the optical space of sense, the curious fact results that in the first province the spatial qualities occur *alone*, unaccompanied by sensational qualities corresponding to the objects, just as if one could see a place or motion without seeing the object which occupied this place or executed this motion. Conceiving spatial qualities as organic sensations which can be excited only *concomitantly* with sensational qualities,[1] the analogy in question does not appear particularly attractive. For the manifold-mathematician, essentially the same case is presented whether an object of definite color moves continuously in optical space, or whether an object spatially fixed passes continuously through the

[1] Compare *The Monist*, Vol. XI., p. 326.

manifold of colors. But for the physiologist and psychologist the two cases are widely different, not only because of what was above adduced, but also, and specifically, because of the fact that the system of spatial qualities is very familiar to us, whereas we can represent to ourselves a system of color-sensations only laboriously and artificially, by means of scientific devices. Color appears to us as an excerpted member of a manifold the arrangement of which is in no wise familiar to us.

The manifolds here analogised with space are, like the color system, also threefold, or they represent a *smaller* number of variations. Space contains surfaces as twofold and lines as onefold manifolds, to which the mathematician, generalising, might also add points as zero-fold manifolds. There is also no difficulty in conceiving analytical mechanics, with Lagrange, as an analytical geometry of four dimensions, time being considered the fourth co-ordinate. In fact, the equations of analytical geometry, in their conformity to the co-ordinates, suggest very clearly to the mathematician the extension of these considerations to an unlimited *larger* number of dimensions. Similarly, physics would be justified in considering an extended material continuum, to each point of which a temperature, a magnetic, electric, and gravitational potential were ascribed, as a portion or section of a multiple manifold. Employment with such symbolic representations must, as the history of science shows us, by no means be regarded as entirely unfruitful. Symbols which initially appear to have no meaning whatever, acquire gradually, after subjection to what might be called intellectual experimentation, a lucid and precise significance. Think only of the negative, fractional, and variable exponents of algebra, or of the cases in which important and vital extensions of ideas have taken place which otherwise would have been totally lost or have made their appearance at a much later date. Think only of the so-called imaginary quantities with which mathematicians long operated, and from which they even obtained important results ere they were in a position to assign to them a perfectly determinate and withal visualisable meaning. But symbolic representation has likewise the disadvantage that the object represented is very easily

lost sight of, and that operations are continued with the symbols to which frequently no object whatever corresponds.[1]

It is easy to rise to Riemann's conception of an n-fold continuous manifold, and it is even possible to realise and visualise portions of such a manifold. Let $a_1, a_2, a_3, a_4 \ldots . a_{n+1}$ be any elements whatsoever (sensational qualities, substances, etc.). If we conceive these elements intermingled in all their possible relations, then each single mixture will be represented by the expression

$$\alpha_1 a_1 + \alpha_2 a_2 + \alpha_3 a_3 + \ldots\ldots \alpha_{n+1} a_{n+1} = 1,$$

where the coefficients α satisfy the equation

$$\alpha_1 + \alpha_2 + \alpha_3 + \ldots\ldots \alpha_{n+1} = 1.$$

Inasmuch, therefore, as n of these coefficients α may be selected at pleasure, the totality of the mixtures of $n+1$ elements will represent an n-fold continuous manifold.[2] As co-ordinates of a point of this manifold, we may regard expressions of the form

$$\frac{a_m}{a_1}, \text{ or } f\left(\frac{a_m}{a_1}\right), \text{ for example, } \log\left(\frac{a_m}{a_1}\right).$$

But in choosing a definition of distance, or of any other notion

[1] I confess that as a young student I was always incensed with symbolic deductions of which the meaning was not perfectly clear and palpable. But historical studies are well adapted to eradicating the tendency to mysticism which is so easily fostered and bred by the somnolent employment of these methods, in that they clearly show the heuristic function of them and at the same time elucidate epistemologically the points wherein they furnish their essential assistance. A symbolical representation of a method of calculation has the same significance for a mathematician as a model or a visualisable working hypothesis has for the physicist. The symbol, the model, the hypothesis runs parallel with the thing to be represented. But the parallelism may extend farther, or be extended farther, than was originally intended on the adoption of the symbol. Since the thing represented and the device representing are after all *different*, what would be concealed in the one is apparent in the other. It is scarcely possible to light directly on an operation like $a^{\frac{1}{2}}$. But operating with such symbols leads us to attribute to them an intelligible meaning. Mathematicians calculated for many decades with expressions like $\cos x + \sqrt{-1} \sin x$ and with exponentials having imaginary exponents until in the struggle for adapting concept and symbol to each other the idea that had been germinating for a century finally found expression in 1806 in Argand, viz., that a relationship could be conceived between magnitude and *direction* by which $\sqrt{-1}$ was represented as a mean direction-proportional between $+1$ and -1.

[2] If the six fundamental color-sensations were totally independent of one another, the system of color-sensations would represent a five-fold manifold. Since they are contrasted in pairs, the system corresponds to a three-fold manifold.

analogous to geometrical concepts, we shall have to proceed very arbitrarily unless *experiences* of the manifold in question inform us that certain metric concepts have a real meaning, and are therefore to be preferred, as is the case for geometric space with the definition[1] derived from the voluminal constancy of bodies for the element of distance $ds^2 = dx^2 + dy^2 + dz^2$, and as is likewise the case for sensations of tone with the logarithmic expression mentioned above. In the majority of cases where such an artificial construction is involved, fixed points of this sort are wanting, and the entire consideration is therefore an ideal one. The analogy to space loses thereby in completeness, fruitfulness, and stimulating power.

In still another direction Riemann elaborated ideas of Gauss; beginning with the latter's investigations concerning curved surfaces. Gauss's measure of the curvature[2] of a surface at any point is given by the expression $k = \frac{d\sigma}{ds}$, where ds is an element of the surface and $d\sigma$ is the superficial element of the unit-sphere, the limiting radii of which are parallel to the limiting normals of the element ds. This measure of curvature may also be expressed in the form $k = \frac{1}{\rho_1 \rho_2}$, where $\rho_1 \rho_2$ are the principal radii of curvature of the surface at the point in question. Of special interest are the surfaces whose measure of curvature for all points has the same value,—the surfaces of *constant* curvature. Conceiving the surfaces as infinitely thin, non-distensible, but flexible bodies, it will be found that surfaces of like curvature may be made to coincide by bending,—as for example a plane sheet of paper wrapped round a cylinder or cone,—but cannot be made to coincide with the surface of a sphere. During such deformation, nay, even on crumpling, the proportional parts of figures drawn *in the surface* remain invariable as to lengths and angles, provided we do not go out of the two dimensions of the surface in our measurements. Conversely, likewise, the curvature of the surface does not depend on its conformation in the third dimension of space, but solely upon its *interior proportionalities*. Riemann, now, conceived the idea of gen-.

[1] Comp. *The Monist*, Vol. XII., pp. 502–503.

[2] *Disquisitiones generales circa superficies curvas*, 1827.

eralising the notion of measure of curvature and applying it to spaces of three or more dimensions. Conformably thereto, he assumes that finite unbounded spaces of constant positive curvature are possible, corresponding to the unbounded but finite two-dimensional surface of the sphere, while what we commonly take to be infinite space would correspond to the unlimited plane of curvature zero, and similarly a third species of space would correspond to surfaces of negative curvature. Just as the figures drawn upon a surface of determinate constant curvature can be displaced without distortion upon this surface only (for example, a spherical figure on the surface of its sphere only, or a plane figure in its plane only), so should analogous conditions necessarily hold for spatial figures and rigid bodies. The latter are capable of free motion only in spaces of constant curvature, as Helmholtz[1] has shown at length. Just as the shortest lines of a plane are infinite, but on the surface of a sphere occur as great circles of definite finite length, closed and reverting into themselves, so Riemann conceived in the three-dimensional space of positive curvature analogues of the straight line and the plane as finite but unbounded. But there is a difficulty here. If we possessed the notion of a measure of curvature for a four-dimensional space, the transition to the special case of three-dimensional space could be easily and rationally executed; but the passage from the special to the more general case involves a certain arbitrariness, and, as is natural, different inquirers have adopted here different courses[2] (Riemann and Kronecker). The very fact that for a one-dimensional space (a curved line of any sort) a measure of curvature does not exist having the significance of an interior measure, and that such a measure first occurs in connection with two-dimensional figures, forces upon us the question whether and to what extent something analogous has any meaning for three-dimensional figures. Are we not subject here to an illusion, in that we operate with symbols to which perhaps nothing

[1] *Ueber die Thatsachen, welche der Geometrie zu Grunde liegen, Göttinger Nachrichten*, 1868, June 3.

[2] Compare, for example, Kronecker, "Ueber Systeme von Functionen mehrerer Variablen." *Ber. d. Berliner Akademie*, 1869.

real corresponds, or at least nothing representable to the senses, by means of which we can verify and rectify our ideas?

Thus were reached the highest and most universal notions regarding space and its relations to analogous manifolds which resulted from the conviction of Gauss concerning the empirical foundations of geometry. But the genesis of this conviction has a preliminary history of two thousand years, the chief phenomena of which we can perhaps better survey from the height which we have now gained.

III.

The unsophisticated men, who, rule in hand, acquired our first geometric knowledge, held to the simplest bodily objects (figures): the straight line, the plane, the circle, etc., and investigated, by means of forms which could be conceived as combinations of these simple figures, the connection of their measurements. It could not have escaped them that the mobility of a body is restricted when one and then two of its points are fixed, and that finally it is altogether checked by fixing three of its points. Granting that rotation about an axis (two points), or rotation about a point in a plane, as likewise displacement with constant contact of two points with a straight line and of a third point with a fixed plane laid through that straight line,—granting that these facts were *separately observed*, it would be known how to distinguish between *pure* rotation, *pure* displacement, and the motion compounded of these two independent motions. The first geometry was of course not based on purely metric notions, but made many considerable concessions to the physiological factors of sense.[1] Thus the appearance is explained of two different fundamental measures: (the straight) length and the angle (circular measure). The straight line was conceived as a rigid mobile body (measuring-rod), and the angle as the rotation of a straight line with respect to another (measured by the arc so described). Doubtless no one ever demanded special proof for the equality of angles at the origin described by the same rota-

[1] Comp. *The Monist*, Vol. XII., p. 509.

tion. Additional propositions concerning angles resulted quite easily. Turning the line b about its intersection with c so as to describe the angle α (Fig. 1), and after coincidence with c turning it again about its intersection with a till it coincides with a and so describes the angle β, we shall have rotated b from its initial to its final position a through the angle μ in the same sense.[1] Therefore the exterior angle $\mu = \alpha + \beta$, and since $\mu + \gamma = 2R$, also $\alpha + \beta + \gamma = 2R$. Displacing (Fig. 2) the rigid system of lines a, b, c which intersect at 1 within their plane to the position 2, the line a always remaining within itself, no alteration of angles will be caused by the mere motion. The sum of the interior angles of the triangle 1 2 3 so produced is evidently $2R$. The same consideration also throws into relief the properties of parallel lines. Doubts as to whether successive rotation about several points is equivalent to rotation about *one* point, whether *pure* displacement is at all possible,—which are justified when a surface of curvature differing

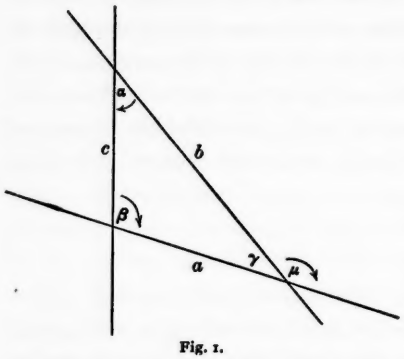

Fig. 1.

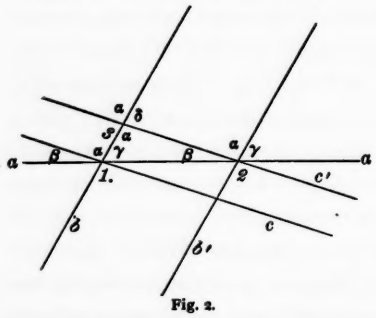

Fig. 2.

[1] C. R. Kosack, *Beiträge zu einer systematischen Entwickelung der Geometrie aus der Anschauung*, Nordhausen, 1852. I was able to see this programme through the kindness of Prof. F. Pietzker of Nordhausen. Similar simple deductions are found in Bernhard Becker's *Leitfaden für den ersten Unterricht in der Geometrie*, Frankfort on the Main, 1845, and in the same author's treatise *Ueber die Methoden des geometrischen Unterrichts*, Frankfort, 1845. I gained access to the first-named book through the kindness of Dr. M. Schuster of Oldenburg.

from zero is substituted for the Euclidean plane,—could never have arisen in the mind of the ingenuous and delighted *discoverer* of these relations at the period we are considering. The study of the movement of rigid bodies, which Euclid studiously avoids and only covertly introduces in his principle of congruence, is to this day the device best adapted to elementary instruction in geometry. An idea is best made the possession of the learner by the method by which it has been found.

This sound and naïve conception of things vanished and the treatment of geometry underwent essential modifications when it became the subject of *professional* and *scholarly* contemplation. The object now was to systematise the knowledge of this province for purposes of individual survey, to separate what was directly cognisable from what was deducible and deduced, and to throw into distinct relief the thread of the deduction. For the purpose of instruction the simplest principles, those most easily gained and apparently free from doubt and contradiction, are placed at the beginning, and the remainder based upon them. Efforts were made to reduce these initial principles to the utmost, as may be observed in the system of Euclid. Through this endeavor to support every notion by another, and to leave to direct knowledge the least possible scope, geometry was gradually detached from the empirical soil out of which it had sprung. People accustomed themselves to regard the derived truths more highly than the directly perceived truths, and ultimately came to demand proofs for propositions which no one ever seriously doubted. Thus arose,—as tradition would have it, to check the onslaughts of the Sophists,—the system of Euclid with its logical perfection and finish. Yet not only were the ways of research designedly concealed by this artificial method of stringing propositions on an arbitrarily chosen thread of deduction, but the varied organic connection between the principles of geometry was quite lost sight of.[1] This system was more fitted to produce nar-

[1] Euclid's system fascinated thinkers by its logical excellences, and its drawbacks were overlooked amid this admiration. Great inquirers, even in recent times, have been misled into following Euclid's example in the presentation of the results of their inquiries, and so into actually concealing their methods of investi-

row-minded and sterile pedants than fruitful, productive investigators. And these conditions were not improved when scholasticism, with its preference for slavish comment on the intellectual products of others, cultivated in thinkers scarcely any sensitiveness for the rationality of their fundamental assumptions and by way of compensation fostered in them an exaggerated respect for the logical form of deductions. The entire period from Euclid to Gauss suffered more or less from this affection of mind.

Among the propositions on which Euclid based his system is found the so-called Fifth Postulate (also called the Eleventh Axiom and by some the Twelfth): "If a straight line meet two straight lines, so as to make the two interior angles on the same side of it taken together less than two right angles, these straight lines being continually produced, shall at length meet upon that side on which are the angles which are less than two right angles." Euclid easily proves that if a straight line falling on two other straight lines makes the alternate angles equal to each other, the two straight lines will *not* meet but are *parallel.* But for the proof of the converse, that parallels make equal alternate angles with *every* straight line falling on them, he is obliged to resort to the Fifth Postulate. This converse is equivalent to the proposition that *only one* parallel to a straight line can be drawn through a point. Further, by the fact that with the aid of this converse it can be proved that the sum of the angles of a triangle is equal to two right angles and that from this last theorem again the first follows, the relationship between the propositions in question is rendered distinct and the fundamental significance of the Fifth Postulate for Euclidean geometry is made plain.

The intersection of slowly converging lines lies without the

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gation, to the great detriment of science. But science is not a feat of legal casuistry. Scientific presentation aims so to expound all the grounds of an idea that it can at any time be thoroughly examined as to its tenability and power. The learner is not to be led half-blindfolded. There therefore arose in Germany among philosophers and educationists a healthy reaction, which proceeded mainly from Herbart, Schopenhauer, and Trendelenburg. The effort was made to introduce greater perspicuity, more genetic methods, and logically more lucid demonstrations into geometry.

province of construction and observation. It is therefore intelligible that in view of the great importance of the assertion contained in the Fifth Postulate the successors of Euclid, habituated by him to rigor, should, even in ancient times, have strained every nerve to demonstrate this postulate, or to replace it by some immediately obvious proposition. Numberless futile efforts were made from Euclid to Gauss, to deduce this Fifth Postulate from the other Euclidean assumptions. It is a sublime spectacle which these men offer: laboring for centuries, from a sheer thirst for scientific elucidation, in quest of the hidden sources of a truth which no person of theory or of practice ever really doubted! With eager curiosity we follow the pertinacious utterances of the ethical power resident in this human search for knowledge, and with gratification we note how the inquirers gradually are led by their failures to the perception that the true basis of geometry is experience. We shall content ourselves with a few examples.

Among the inquirers notable for their contributions to the theory of parallels are the Italian Saccheri and the German mathematician Lambert. In order to render their mode of attack intelligible, we will remark first that the existence of rectangles and squares, which we fancy we constantly observe, cannot be demonstrated without the aid of the Fifth Postulate. Let us consider, for example, two congruent isosceles triangles ABC, DBC, having right angles at A and D (Fig. 3), and let them be laid together at their hypothenuses BC so as to form the equilateral quadrilateral $ABCD$; the first twenty-seven propositions of Euclid do not suffice to determine the character and magnitude of the two equal

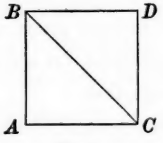

Fig. 3.

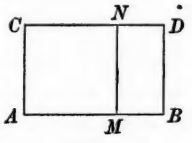

Fig. 4.

(right) angles at B and C. For measure of length and measure of angle are fundamentally different and directly not comparable; hence the first propositions regarding the connection of sides and

angles are *qualitative* only, and hence the imperative necessity of a *quantitative* theorem regarding angles, like that of the angle-sum. Be it further remarked that theorems analogous to the twenty-seven planimetric propositions of Euclid may be set up for the surface of a sphere and for surfaces of constant negative curvature, and that in these cases the analogous construction gives respectively obtuse and acute angles at B and C.

Saccheri's cardinal achievement was his form of stating the problem.[1] If the Fifth Postulate is involved in the remaining assumptions of Euclid, then it will be possible to prove without its aid that in the quadrilateral $ABCD$ (Fig. 4) having right angles at A and B and $AC=BD$, the angles at C and D likewise are right angles. And, on the other hand, in this event, the assumption that C and D are either obtuse or acute will lead to contradictions. Saccheri, in other words, seeks to draw conclusions from the hypothesis of the right, the obtuse, or the acute angle. He shows that each of these hypotheses will hold in all cases if it be proved to hold in one. It is needful to have only one triangle with its angles $\lessgtr 2R$ in order to demonstrate the universal validity of the hypothesis of the acute, the right, or the obtuse angle. Notable is the fact that Saccheri also adverts to *physico-geometrical* experiments which support the hypothesis of the right angle. If a line CD (Fig. 4) join the two extremities of the equal perpendiculars erected on a straight line AB, and the perpendicular dropped on AB from any point N of the first line, viz., NM, be equal to $CA=DB$, then is the hypothesis of the right angle demonstrated to be correct. Saccheri rightly does not regard it as self-evident that the line which is equidistant from another straight line is itself a straight line. Think only of a circle parallel to a great circle on a sphere which does not represent a shortest line on a sphere and the two faces of which cannot be made congruent.

Other experimental proofs of the correctness of the hypothesis of the right angle are the following. If the angle in a semicircle

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[1] *Euclides ab omni naevo vindicatus.* Milan, 1733. German translation in Engel and Staeckel's *Die Theorie der Parallellinien.* Leipsic, 1895.

(Fig. 5) is shown to be a right angle, $\alpha+\beta=R$, then is $2\alpha+2\beta=2R$, the sum of the angles of the triangle ABC. If the radius be subtended thrice in a semicircle and the line joining the first and the fourth extremity pass through the center, we shall have at C

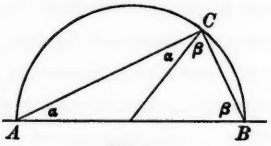

Fig. 5.

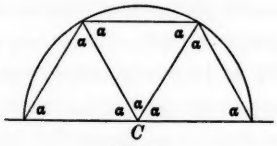

Fig. 6.

(Fig. 6) $3\alpha=2R$, and consequently each of the three triangles will have the angle-sum $2R$. The existence of equiangular triangles of different sizes (similar triangles) is likewise subject to experimental proof. For (Fig. 7) if the angles at B and C give $\beta+\delta+\gamma+\epsilon=4R$, so also is $4R$ the angle-sum of the quadrilateral $BCB'C'$. Even Wallis[1] (1663) based his proof of the Fifth Postulate on the assumption of the existence of similar triangles, and a modern geometer, Delbœuf, deduced from the assumption of similitude the entire Euclidean geometry.

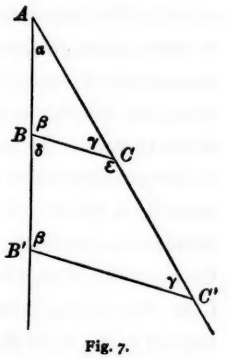

Fig. 7.

The hypothesis of the obtuse angle, Saccheri fancied he could easily refute. But the hypothesis of the acute angle presented to him difficulties, and in his quest for the expected contradictions he was carried to the most far-reaching conclusions, which Lobachévski and Bolyai subsequently rediscovered by methods of their own. Ultimately he felt compelled to reject the last-named hypothesis as incompatible with the nature of the straight line; for it led to the assumption of different kinds of straight lines, which met at infinity, that is, had there a common perpendicular. Saccheri did much in anticipation and promotion of the labors that were subsequently to elucidate these matters, but exhibited withal toward the traditional views a certain bias.

[1] Engel and Staeckel, *loc. cit.*, p. 21 et seq.

Lambert's treatise[1] is allied in method to that of Saccheri, but it proceeds farther in its conclusions, and gives evidence of a less constrained vision. Lambert starts from the consideration of a quadrilateral with three right angles, and examines the consequences that would follow from the assumption that the fourth angle was right, obtuse, or acute. The similarity of figures he finds to be incompatible with the second and third assumptions. The case of the obtuse angle, which requires the sum of the angles of a triangle to exceed $2R$, he discovers to be realised in the *geometry of spherical surfaces*, in which the difficulty of parallel lines entirely vanishes. This leads him to the conjecture that the case of the acute angle, where the sum of the angles of a triangle is less than $2R$, might be realised on the surface of a sphere of imaginary radius. The amount of the departure of the angle-sum from $2R$ is in both cases proportional to the area of the triangle, as may be demonstrated by appropriately dividing large triangles into small triangles, which on diminution may be made to approach as near as we please to the angle-sum $2R$. Lambert advanced very closely in this conception to the point of view of modern geometers. Admittedly a sphere of imaginary radius, $r\sqrt{-1}$ is not a visualisable geometric construct, but analytically it is a surface having a negative constant Gaussian measure of curvature. It is evident again from this example how experimenting with *symbols* also may direct inquiry to the right path, in periods where other points of support are entirely lacking and where every helpful device must be esteemed at its worth.[2] Even Gauss appears to have thought of a sphere of imaginary radius, as is obvious from his formula for the circumference of a circle (*Letter to Schumacher*, July 12, 1831). Yet in spite of all, Lambert actually fancied he had approached so near to the proof of the Fifth Postulate that what was lacking could be easily supplied.

We may turn now to the investigators whose views possess a most radical significance for our conception of geometry, but who announced their opinion only briefly, by word of mouth or letter.

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[1] Engel and Staeckel, *loc. cit.*, p. 152 et seq.

[2] See note, p. 8.

"Gauss regarded geometry merely as a logically consistent system of constructs, with the theory of parallels placed at the pinnacle as an axiom; yet he had reached the conviction that this proposition could not be proved, though it was known from *experience*,—for example, from the angles of the triangle joining the Brocken, Hohenhagen, and Inselsberg,—that it was approximately correct. But if this axiom be not conceded, then, he contends, there results from its non-acceptance a different and entirely independent geometry, which he had once investigated and called by the name of the Anti-Euclidean geometry." Such, according to Sartorius von Waltershausen, was the view of Gauss.[1]

Starting at this point, O. Stolz, in a small but very instructive pamphlet,[2] sought to deduce the principal propositions of the Euclidean geometry from the purely observable facts of experience. We shall reproduce here the most important point of Stolz's brochure. Let there be given (Fig. 8) *one* large triangle ABC having the angle-sum $2R$. We draw the perpendicular AD on BC, complete the figure by $BAE \cong ABD$ and $CAF \cong ACD$, and add to the figure $BCFAE$ the congruent figure $CBHA'G$. We obtain thus a

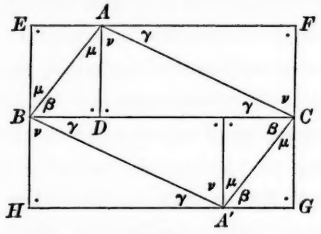

Fig. 8.

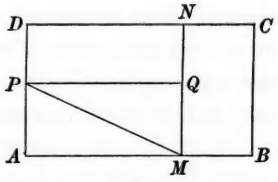

Fig. 9.

single rectangle, for the angles at E, F, G, H are right angles and those at A, C, A', B are straight angles (equal to $2R$), the boundary lines therefore straight lines and the opposite angles equal. A rectangle can be divided into two congruent rectangles by a perpendicular erected at the middle point of one of its sides, and by

[1] *Gauss zum Gedächtniss*, Leipsic, 1856.

[2] *Das letzte Axiom der Geometrie. Berichte des naturw.-medicin. Vereins zu Innsbruck*, 1886, pp. 25–34.

continuing this procedure the line of division may be brought to any point we please in the divided side. And the same holds true of the other two opposite sides. It is possible, therefore, from a given rectangle *ABCD* (Fig. 9) to cut out a smaller *AMPQ* having sides bearing any proportion to one another. The diagonal of this last divides it into two congruent *right-angled* triangles, of which each, independently of the ratio of the sides, has the angle-sum $2R$. Every oblique-angled triangle can by the drawing of a perpendicular be decomposed into right-angled triangles, each of which can again be decomposed into right-angled triangles having still smaller sides,—so that $2R$, therefore, results for the angle-sum of *every* triangle if it holds true exactly of *one*. By the aid of these propositions which repose on observation we *conclude* easily that the two opposite sides of a rectangle (or of any so-called parallelogram) are everywhere, no matter how far prolonged, the same distance apart, that is, never intersect. They have the properties of the Euclidean *parallels*, and may be called and *defined* as such. It likewise *follows*, now, from the properties of triangles and rectangles, that two straight lines which are cut by a third straight line so as to make the sum of the interior angles on the same side of them less than two right angles will meet on that side, but in either direction from their point of intersection will move indefinitely far away from each other. The straight line therefore is *infinite*. What was a *groundless* assertion stated as an axiom or an initial principle may as *inference* have a sound meaning.

Geometry, accordingly, consists of the application of mathematics to experiences concerning space. Like mathematical physics, it can become an exact deductive science only on the condition of its representing the objects of experience by means of schematising and idealising concepts. Just as mechanics can assert the constancy of masses or reduce the interactions between bodies to *simple* accelerations *only within the limits of errors of observation*, so likewise the existence of straight lines, planes, the amount of the angle-sum, etc., can be maintained only on a similar restriction. But just as physics sometimes finds itself constrained to replace its ideal assumptions by other more general ones, viz., to put in the

place of a constant acceleration of falling bodies one dependent on the distance, instead of a constant quantity of heat a variable quantity,—so a similar procedure is permissible in geometry, when it is demanded by the facts or is necessary temporarily for scientific elucidation. And now the endeavors of Legendre, Lobachévski, and the two Bolyai's, the younger of whom was probably indirectly inspired by Gauss, will appear in their right light.

Of the labors of Schweickart and Taurinus, also contemporaries of Gauss, we will not speak. Lobachévski's works became first known to the world of thinkers and so productive of results (1829). Very soon afterward the publication of the younger Bolyai appeared (1833), which agreed in all essential points with Lobachévski's, departing from it only in the form of its developments. According to the originals which have been made almost completely accessible to us in the beautiful editions of Engel and Staeckel,[1] it is permissible to assume that Lobachévski also undertook his investigations in the hope of becoming involved in contradictions by the rejection of the Euclidean axiom. But after he found himself mistaken in this expectation, he had the *intellectual courage* to draw all the consequences from this fact. Lobachévski gives his conclusions in synthetic form. But we can fairly well imagine the general analysing considerations that paved the way for the construction of his geometry.

From a point lying outside a straight line g (Fig. 10) a perpendicular p is dropped and through the same point in the plane

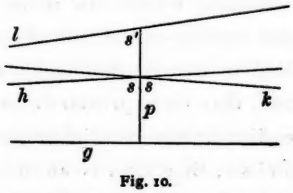

Fig. 10.

pg a straight line h is drawn, making with the perpendicular an acute angle s. Making tentatively the assumption that g and h do

[1] *Urkunden zur Geschichte der nichteuklidischen Geometrie.* L. N. I. Lobatschefskij. Leipzig, 1899.

not meet but that on the slightest diminution of the angle s they would meet, we are at once forced by the homogeneity of space to the conclusion that a *second* line k having the same angle s similarly deports itself on the other side of the perpendicular. Hence all non-intersecting lines drawn through the same point are situate between h and k. The latter form the *boundaries* between the intersecting and non-intersecting lines and are called by Lobachévski *parallels*.

In the Introduction to his *New Elements of Geometry* (1835) Lobachévski proves himself a thorough natural inquirer. No one would think of attributing even to an ordinary man of sense the crude view that the "parallel-angle" was very much less than a right angle, when on slight prolongation it could be distinctly seen that they would intersect. The relations here considered admit of representation only in drawings that distort the true proportions, and we have on the contrary to picture to ourselves that with the dimensions of the cut the variation of s from a right angle is so small that h and k are to the eye undistinguishably coincident. Prolonging, now, the perpendicular p to a point beyond its intersection with h, and drawing through its extremity a new line l parallel to h and therefore parallel also to g, it follows that the parallel-angle s' must necessarily be less than s, if h and l are not again to fulfil the conditions of the Euclidean case. Continuing in the same manner, the prolongation of the perpendicular and the drawing of parallels, we obtain a parallel-angle that constantly decreases. Considering, now, parallels which are more remote and consequently converge more rapidly on the side of convergence, we shall logically be compelled to assume, not to be at variance with the preceding supposition, that on approach or on the decrease of the length of the perpendicular the parallel-angle will again increase. The angle of parallelism, therefore, is an inverse function of the perpendicular p, and has been designated by Lobachévski by $\Pi(p)$. A group of parallels in a plane has the arrangement shown schematically in Figure 11. They all approach one another asymptotically toward the side of their convergence. The homogeneity of space requires that every "strip" between two parallels can be

made to coincide with every other strip provided it be displaced the requisite distance in a longitudinal direction.

If a circle be imagined to increase indefinitely, its radii will cease to intersect the moment the increasing arcs reach the point where their convergence corresponds to parallelism. The circle then passes over into the so-called "*boundary-line.*" Similarly the surface of a sphere, if it indefinitely increase, will pass into what Lobachévski calls a "*boundary-surface.*" The boundary-lines bear a relation to the boundary-surface analogous to that which a great circle bears to the surface of a sphere. The geometry of the surface of a sphere is independent of the axiom of parallels. But

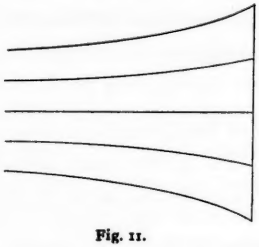

Fig. 11.

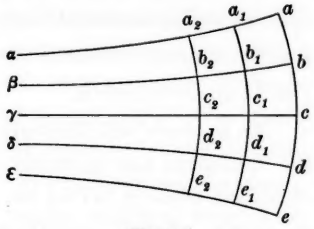

Fig. 12.

since it can be demonstrated that triangles formed from boundary-lines on a boundary-surface no more exhibit an excess of angle-sum than do finite triangles on a sphere of infinite radius, therefore the rules of the Euclidean geometry also hold good for these boundary-triangles. To find points of the boundary-line, we determine in a bundle of parallels aa, $b\beta$, $c\gamma$, $d\delta$.... lying in a plane points a, b, c, d in each of these parallels so situated with respect to the point a in aa that $\angle aab = \angle \beta ba$, $\angle aac = \angle \gamma ca$, $\angle aad = \angle \delta da$..... Owing to the sameness of the entire construction, each of the parallels may be regarded as the "*axis*" of the boundary line, which will generate, when revolved about this axis, the boundary-surface. Likewise each of the parallels may be regarded as the axis of the boundary-surface. For the same reason all boundary-lines and all boundary-surfaces are *congruent.* The intersection of every plane with the boundary-surface is a *circle*; it is a boundary-line only when the cutting plane contains the axis. In the Euclidean geometry there is no boundary-line, nor boundary-surface. The analo-

gues of them are here the straight line and the plane. If no boundary-line exists, then necessarily must any three points not in a straight line lie on a circle. Hence the younger Bolyai was able to replace the Euclidean axiom by this last postulate.

Let aa, $b\beta$, $c\gamma$ be a system of parallels, and $a\epsilon$, $a_1\epsilon_1$, $a_2\epsilon_2$.... a system of boundary-lines, each of which systems divides the other into equal parts. The ratio to each other of any two boundary-arcs between the same parallels, e. g., the arcs $a\epsilon = u$ and $a_2\epsilon_2 = u'$, is dependent therefore solely on their distance apart $aa_2 = x$. We may put generally $\frac{u}{u'} = e^{\frac{x}{k}}$, where k is so chosen that ϵ shall be the base of the Naperian system of logarithms. In this manner exponentials and by means of these hyperbolic functions are introduced. For the angle of parallelism we obtain $s = cot\frac{1}{2}\Pi(p) = \epsilon^{\frac{p}{k}}$. If $p = o$, $s = \frac{\pi}{2}$; if $p = \infty$, $s = 0$.

An example will illustrate the relation of the Lobachévskian to the Euclidean and spherical geometries. For a rectilinear Lobachévskian triangle having the sides a, b, c, and the angles A, B, C, we obtain, when C is a right angle,

$$\sinh\frac{a}{k} = \sinh\frac{c}{k}A.$$

Here *sinh* stands for the hyperbolic sine, $\sinh x = \frac{\epsilon^x - \epsilon^{-x}}{2}$,

whereas $$\sin x = \frac{\epsilon^{xi} - \epsilon^{-xi}}{2i},$$

or, $$\sinh x = \frac{x}{1!} + \frac{x^3}{3!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \ldots\ldots,$$

and $$\sin x = \frac{x}{1!} - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7} + \ldots\ldots$$

Considering the relations $\sin(xi) = i(\sinh x)$, or $\sinh(xi) = i\sin x$, involved in the foregoing formulæ, it will be seen that the above-given formula for the Lobachévskian triangle passes over into the formula holding for the *spherical* triangle, viz., $\sin\frac{a}{k} = \sin\frac{c}{k}\sin A$, when ki is put in the place of k in the former and k is considered

[1] F. Engel, *N. I. Lobatschefskji, Zwei geometrische Abhandlungen*, Leipsic, 1899.

as the radius of the sphere, which in the usual formulæ assumes the value unity. The re-transformation of the spherical formula into the Lobachévskian by the same method is obvious. If k be very great in comparison with a and c, we may restrict ourselves to the first member of the series for sinh or sin, obtaining in both cases, $\frac{a}{k} = \frac{c}{k} \sin A$ or $a = c \sin A$, the formulæ of *plane Euclidean* geometry, which we may regard as a limiting case of both the Lobachévskian and spherical geometries for very large values of k, or for $k = \infty$. It is likewise permissible to say that all three geometries coincide in the domain of the infinitely small.

As we see, it is possible to construct a self-consistent, non-contradictory system of geometry solely on the assumption of the convergence of parallel lines. True, there is not a single observation of the geometrical facts accessible to us that speaks in favor of this assumption, and admittedly the hypothesis is at so great variance with our geometrical instinct as easily to explain the attitude toward it of the earlier inquirers like Saccheri and Lambert. Our imagination, dominated as it is by our modes of visualising and by the familiar Euclidean concepts, is competent to grasp only piecemeal and gradually Lobachévski's views. We must suffer ourselves to be led here rather by mathematical *concepts* than by *sensuous images* derived from a single narrow portion of space. But we must grant, nevertheless, that the quantitative mathematical concepts by which we through our own initiative and within a certain arbitrary scope represent the facts of geometrical experience, do not reproduce the latter with absolute exactitude. Different ideas can express the facts with the same exactness in the domain accessible to observation. The *facts* must hence be carefully distinguished from the *intellectual* constructs the formation of which they suggested. The latter—the concepts—must be *consistent* with observation, and must in addition be *logically* in accord with one another. Now these two requirements can be fulfilled in *more than one* manner, and hence the different systems of geometry.

Manifestly the labors of Lobachévski were the outcome of protracted and intense mental effort, and it may be surmised that he

first gained a clear conception of his system from general considerations and by analytic (algebraic) methods before he was able to present it synthetically. Expositions in this cumbersome Euclidean form are by no means alluring, and it is possibly due mainly to this fact that the significance of Lobachévski's and Bolyai's labors received such tardy recognition.

Lobachévski developed only the consequences of the modification of Euclid's Fifth Postulate. But if we abandon the Euclidean assertion that "two straight lines cannot enclose a space," we shall obtain a companion-piece to the Lobachévskian geometry. Restricted to a surface, it is the geometry of the surface of a sphere. In place of the Euclidean straight lines we have great circles, all of which intersect twice and of which each pair encloses two spherical lunes. There are therefore no parallels. Riemann first intimated the possibility of an analogous geometry for three-dimensional space (of positive curvature),—a conception that does not appear to have occurred even to Gauss, possibly owing to his predilection for infinity. And Helmholtz,[1] who continued the researches of Riemann physically, neglected in his turn, in his first publication, the development of the Lobachévskian case of a space of negative curvature (with an imaginary parameter k). The consideration of this case is in point of fact more obvious to the mathematician than it is to the physicist. Helmholtz treats in the publication mentioned only the Euclidean case of the curvature zero and Riemann's space of positive curvature.

IV.

We are able, therefore, to represent the facts of spatial observation with all possible precision by both the Euclidean geometry and the geometries of Lobachévski and Riemann, provided in the two latter cases we take the parameter k large enough. Physicists have as yet found no reason for starting from the assumption $k = \infty$ of the Euclidean geometry. It has been their practice, the result of long and tried experience, to adhere steadfastly to the *simplest*

[1] "Ueber die thatsächlichen Grundlagen der Geometrie," 1866. *Wissensch. Abhandl.*, II., p. 610 et seq.

assumptions until the facts forced their complication or modification. This accords likewise with the attitude of all great mathematicians toward *applied* geometry. The deportment of physicists and mathematicians toward these questions is in the main different, but this is explained by the circumstance that for the former class of inquirers the physical facts are of most significance, geometry being for them merely a convenient implement of investigation, while for the latter class these very questions are the main material of research, and of greatest technical and particularly epistemological interest. Supposing a mathematician to have modified tentatively the simplest and most immediate assumptions of our geometrical experience, and supposing his attempt to have been productive of fresh insight, certainly nothing is more natural than that these researches should be further prosecuted, in a purely mathematical interest. Analogues of the geometry we are familiar with, are constructed on broader and more general assumptions for any number of dimensions, with no pretention to being regarded as more than intellectual scientific experiments and with no idea of being applied to reality. In support of my remark it will be sufficient to advert to the advances made in mathematics by Clifford, Klein, Lie, and others. Seldom have thinkers become so steeped in revery, or so far estranged from reality, as to imagine for our space a number of dimensions *exceeding the three of the given space of sense*, or to conceive of representing that space by any geometry that appreciably departs from the Euclidean. Gauss, Lobachévski, Bolyai, and Riemann were perfectly clear on this point, and cannot certainly be held responsible for the grotesque fictions which subsequently arose in this field.

It little accords with the principles of a physicist to make suppositions regarding the deportment of geometrical constructs in infinity and non-accessible places, then subsequently to compare them with our immediate experience and adapt them to it. He prefers, like Stolz, to regard what is directly given as the source of his ideas, which he considers applicable also to what is inaccessible until obliged to change them. But he too may be extremely grateful for the discovery that there exist *several* sufficing geome-

tries, that we can manage also with a *finite* space, etc.,—grateful, in short, for the abolition of certain *conventional barriers* of thought.

If we lived on the surface of a planet with a turbid, opaque atmosphere, and, on the supposition that the surface of the earth was a plane and our only instruments were square and chain, we undertook measurements, the increase in the excess of the angle-sum of large triangles would soon compel us to substitute a spherometry for our planimetry. The *possibility* of analogous experiences in three-dimensional space the physicist cannot as a matter of *principle* reject, although the phenomena that would compel the acceptance of a Lobachévskian or a Riemannian geometry would present so odd a contrast with that to which we have been hitherto accustomed, that no one will regard their actual occurrence as *probable*.

The question whether a given *physical* object is a straight line or the arc of a circle is not properly formulated. A stretched chord or a ray of light is certainly neither the one nor the other. The question is simply whether the object so spatially reacts that it conforms better to the one concept than to the other, and whether with the exactitude which is sufficient for us and obtainable by us it conforms at all to any geometric concept. Excluding the latter case, the question arises, whether we can practically remove, or at least determine in thought and make allowance for, the *deviation* from the straight line or circle, in other words, *correct* the result of the measurement. But we are dependent always, in practical measurements, on the comparison of *physical* objects. If on direct investigation these coincided with the geometric concepts to the highest attainable point of accuracy, but the indirect results of the measurement deviated more from the theory than the consideration of all possible errors permitted, then certainly we should be obliged to *change* our physico-metric notions. The physicist will do well to await the occurrence of such a situation, while the mathematician will always have free scope for his speculations.

Of all the concepts which the natural inquirer employs, the *simplest* are the concepts of space and time. Spatial and temporal objects conforming to his conceptual constructs can be framed with

great *exactness*. Nearly every observable *deviation* can be eliminated. We can imagine any spatial or temporal construct realised without doing violence to a fact. The remaining physical properties of bodies are so intimately connected that here arbitrary fictions are subjected to narrow restrictions by the facts. A perfect gas, a perfect fluid, a perfectly elastic body does not exist; the physicist knows that his fictions conform only approximately and by arbitrary simplifications to the facts; he is perfectly aware of the deviation, which cannot be removed. We can conceive a sphere, a plane, etc., constructed *with unlimited exactness*, without running counter to any fact. Hence, if any new physical fact happens to render a modification of our concepts necessary, the physicist will prefer to sacrifice the less perfect concepts of physics rather than to give up the simpler, more perfect, and more lasting concepts of geometry, which forms the solidest foundation of all his theories.

But from another direction the physicist can derive substantial assistance from the labors of geometers. Our geometry refers always to objects of sensuous experience. But the moment we begin to operate with mere things of thought like atoms and molecules, which from their very nature *can never be made the objects of sensuous contemplation*, we are under no obligation whatever to think of them as standing in spatial relationships which are peculiar to the Euclidean three-dimensional space of our sensuous experience. This may be recommended to the special attention of thinkers who deem atomistic speculations indispensable.[1]

Let us go back in thought to the origin of geometry in the practical needs of life. The recognition of the spatial substantial-

[1] While still an upholder of the atomic theory, I sought to explain the line-spectra of gases by the vibrations of the atomic constituents of a gas-molecule with respect to another. The difficulties which I here encountered suggested to me (1863) the idea that non-sensuous things did not necessarily have to be pictured in our sensuous space of three dimensions. In this way I also lighted upon analogues of spaces of different numbers of dimensions. The collateral study of various physiological manifolds (see footnote on page 4 of this article) led me to the problems discussed in the conclusion of this paper. The notion of finite spaces, converging parallels, etc., which can come only from a historical study of geometry, was at that time remote from me. I believe that my critics would have done well had they not overlooked the italicised paragraph. For details see the notes to my *Erhaltung der Arbeit*, Prague, 1872.

ity and spatial invariability of spatial objects in spite of their movements is a biological necessity for human beings, for spatial quantity is related directly to the quantitative satisfaction of our needs. When knowledge of this sort is not sufficiently provided for by our physiological organisation, we employ our hands and feet for comparison with the spatial object. When we begin to compare *bodies* with one another, we enter the domain of physics, whether we employ our hands or an artificial measure. All *physical* determinations are *relative*. Therefore, all *geometrical* determinations likewise possess validity *relatively* to the measure. The concept of measurement is a concept of relation, which contains nothing not contained in the measure. In geometry we simply assume that the measure will always and everywhere coincide with that with which it has at some other time and some other place coincided. But this assumption is determinative of nothing concerning the measure. In place of spatial *physiological* equality is substituted an altogether differently defined *physical* equality, which must not be confounded with the former, no more than the indications of a thermometer are to be identified with the sensation of heat. The practical geometer, it is true, determines the dilatation of a heated measure, by means of a measure kept at a constant temperature, and takes account of the fact that the relation of congruence in question is disturbed by this non-spatial physical circumstance. But to the pure theory of space all assumptions regarding the measure are foreign. Simply the physiologically created habit of regarding the measure as invariable is tacitly but unjustifiably retained. It would be quite superfluous and meaningless to assume that the measure, and therefore bodies generally, suffered alterations on displacement in space or that they remained unchanged on such displacement,—a fact which in its turn could only be determined by the use of a new measure. The *relativity* of all spatial relations is made manifest by these considerations.

If the criterion of spatial equality is substantially modified by the introduction of measure, it is subjected to a still further modification, or intensification, by the introduction of the notion of *number* into geometry. There is nicety of distinction gained by this

introduction which the idea of congruence alone could never have attained. The application of arithmetic to geometry leads to the notion of *incommensurability* and *irrationality*. Our geometric concepts therefore contain adscititious elements not intrinsic to space; they represent space with a certain latitude, and arbitrarily also with greater precision than spatial observation could possibly realise. This imperfect contact between fact and concept explains the possibility of different systems of geometry.[1]

V.

The entire movement which led to the transformation of our ideas of geometry must be characterised as a sound and healthful one. This movement, which began centuries ago but is now greatly intensified, is not to be looked upon as having terminated. On the contrary, we are quite justified in the expectation that it will redound not only to the great advancement of mathematics and geometry, especially in an epistemological regard, but also to that of the other sciences. This movement was, it is true, powerfully stimulated by a few eminent men, but it sprang, nevertheless, not from an individual, but from a general need. This will be seen from the difference in the professions of the men who have taken part in it. Not only the mathematician, but also the philosopher and the educationist, have made large contributions to it. So, too, the methods pursued by the different inquirers are not unrelated. Ideas which Leibnitz[2] uttered recur in slightly altered form in Fourier,[3] Lobachévski, Bolyai, and H. Erb.[4] The philosopher Ueberweg,[5] closely approaching in his opposition to Kant

[1] It would be too much to expect of matter that it should realise all the atomistic fantasies of the physicist. So, too, space, as an object of experience, can hardly be expected to satisfy all the ideas of the mathematician, though there be no doubt whatever as to the general value of their investigations.

[2] See *The Monist*, Vol. XII., pp. 488, 498, and 499.

[3] *Séances de l'École Normale. Débats.* Vol. I., 1800, p. 28.

[4] H. Erb, Grossherzoglich Badischer Finanzrath, *Die Probleme der geraden Linie, des Winkels und der ebenen Fläche*, Heidelberg, 1846.

[5] "Die Principien der Geometrie wissenschaftlich dargestellt." *Archiv für Philologie und Pädagogik*. 1851. Reprinted in Brasch's *Welt- und Lebensanschauung F. Ueberwegs*, Leipzig, 1889, pp. 263–317.

the views of the psychologist Beneke,[1] and in his geometrical ideas starting from Erb (which later writer mentions K. A. Erb[2] as his predecessor) anticipates a goodly portion of Helmholtz's labors.

The results to which the preceding discussion has led, may be summarised as follows:

1. The source of our geometric concepts has been found to be experience.

2. The multiplicity of the concepts satisfying the same geometrical facts has been revealed.

3. By the comparison of space with other manifolds, more general concepts were reached, of which the geometric represented a special case. Geometric thought was thus freed from conventional limitations, heretofore imagined insuperable.

4. By the demonstration of the existence of manifolds allied to but different from space, entirely new questions were suggested. What is space physiologically, physically, geometrically? To what are its specific properties to be attributed, since others are also conceivable? Why is space three-dimensional, etc.?

With questions such as these, though we must not expect the answer to-day or to-morrow, we stand before the entire profundity of the domain to be investigated. We shall say nothing of the inept strictures of the Bœotians, whose coming Gauss predicted, and whose attitude determined him to reserve. But what shall we say to the acrid and captious criticisms to which Gauss, Riemann and their associates have been subjected by men of high standing in the scientific world. Have they never experienced in their own persons the truth that inquirers at the outermost boundaries of knowledge discover many things that do not slip smoothly into all heads, but which are not on that account nonsense? True, such inquirers are liable to error, but even the errors of some men are often more fruitful in their consequences than the discoveries of others.

VIENNA, February, 1903. ERNST MACH.

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[1] *Logik als Kunstlehre des Denkens*, Berlin, 1842, Vol. II., pp. 51–55.

[2] *Zur Mathematik und Logik*, Heidelberg, 1821. I was unable to examine this work.

ANTS AND SOME OTHER INSECTS.[1]

AN INQUIRY INTO THE PSYCHIC POWERS OF THESE ANIMALS WITH AN APPENDIX ON THE PECULIARITIES OF THEIR OLFACTORY SENSE.

WHEN discussing the ant-mind, we must consider that these small animals, on the one hand, differ very widely from ourselves in organisation, but on the other hand, have come, through so-called convergence, to possess in the form of a social commonwealth a peculiar relationship to us. My subject, however, requires the discussion of so many complicated questions that I am compelled to assume acquaintance with the work of others, especially the elements of psychology, and in addition the works of P. Huber, Wasmann, von Buttel-Reepen, Darwin, Romanes, Lubbock, my *Fourmis de la Suisse*, and many others. Since the functions of the sense-organs constitute the basis of comparative psychology, I must also refer to a series of articles entitled "Sensations des Insects" which I have recently published (1900–1901) in the *Rivista de Biologia Generale*, edited by Dr. P. Celesia. In these papers I have defined my position with respect to various authors, especially Plateau and Bethe.

Very recently Bethe, Uexkull, and others have denied the existence of psychic powers in invertebrate animals. They explain the latter as reflex-machines, and take their stand on the ground of the so-called psycho-physical parallelism for the purpose of demon-

[1] Lectures delivered in Berlin, August 13, 1901, before the Fifth International Congress of Zoölogists. Published by Ernst Reinhard, Munich, 1901. Translated from the German by William Morton Wheeler.

strating our inability to recognise mental qualities in these animals. They believe, however, that they can prove the mechanical regularity of behavior, but assume unknown forces whenever they are left in the lurch in their explanations. They regard the mind as first making its appearance in the vertebrates, whereas the old Cartesians regarded all animals, in contradistinction to man, as mindless (unconscious) machines.

The Jesuit father E. Wasmann and von Buttel-Reepen are willing, on the other hand, to accept the inductive inference from analogy as a valid scientific method. Like Lubbock, the lecturer and others, they advocate a comparative psychology of the invertebrates and convincingly demonstrate the existence of psychic faculties in these animals. Wasmann, however, puts a very low estimate on the mental powers of the higher vertebrates and, in my opinion, improperly, denies to them any ability of drawing inferences from experience when in the presence of new conditions (this alone he designates as intelligence); he believes that man alone possesses an immortal soul (independent of natural laws?) in addition to the animal mind.

It is necessary, first of all, to arrive at some common understanding concerning the obscure notion "psychic" in order that we may avoid logomachy, and carrying on theology in the sense of Goethe's Mephistopheles. Two concepts are confounded in an obscure manner in the word "psychic": first, the abstract concept of introspection, or subjectivism, i. e., observation from within, which every person knows only, and can know only, in and by himself. For this let us reserve the term "consciousness." Second, the "activity" of the mind or that which determines the contents of the field of consciousness. This has been included without further ado with consciousness in the wider sense, and thence has arisen the confusion of regarding consciousness as an attribute of the mind. In another place I have designated the molecular wave of activity of the neural elements as "neurocyme."

We cannot speak of the consciousness of human beings other than ourselves without drawing an inference from analogy; quite as little ought we to speak of a consciousness of forgotten things.

The field of our consciousness is constantly changing. Things appear in it and disappear from it. Memory, through association, enables us to recall, more or less directly and with more or less difficulty, things which appear to be momentarily absent from consciousness. Moreover, both the experience of self-observation and the phenomena of hypnotism teach us experimentally that many things of which we seem to be unconscious, are nevertheless present in consciousness or have been. Indeed, certain sense-impressions remain, at the moment of their occurrence, unconscious so far as our ordinary consciousness or superconsciousness is concerned, although they can be subsequently recalled into consciousness by suggestion. Whole chains of brain-activities, (dreams, somnambulism, or secondary consciousness) seem ordinarily to be excluded from the superconsciousness, but may subsequently be associated by suggestion with the remembered contents of consciousness. In all these cases, therefore, what seems to be unconscious is after all proved to be conscious. The above-mentioned phenomena have frequently led to mystical interpretations, but they are explainable on a very simple assumption. Let us assume —and this is quite in harmony with observation—that the fields of the introspectively conscious brain-activities are limited by so-called association or dissociation processes, i. e., that we are unable actively to bring them all into connection at the same time, and that therefore all that seems to us unconscious has also in reality a consciousness, in other words, a subjective reflex, then the following results: Our ordinary waking consciousness or superconsciousness is merely an inner subjective reflex of those activities of attention which are most intimately connected with one another, i. e., of the more intensively concentrated maxima of our cerebral activities during waking. There exist, however, other consciousnesses, partly forgotten, partly only loosely or indirectly connected with the contents of the superconsciousness, in contradistinction to which these may be designated as subconsciousness. They correspond to other less concentrated or otherwise associated cerebral activities. We are bound to assume the existence of still more remotely intercon-

nected subconsciousnesses for the infra-cortical (lower) brain-centers, and so on.

It is easy to establish the fact that the maximum of our psychic activity, namely, attention, passes every moment from one perception or thought to another. These objects of attention, as visual or auditory images, will-impulses, feelings or abstract thoughts, come into play—and of this there is no doubt—in different brain-regions or neuron-complexes. We can therefore compare attention to a functional *macula lutea* wandering in the brain, or with a wandering maximal intensity of neurocymic activity. But it is quite as satisfactorily established that other psychic phenomena external to attention are likewise present in consciousness, though in a feebler condition. Finally, it is well known that all that has been in consciousness—even that which is now more, now less, forgotten—is included in the psychic, i. e., in the contents of consciousness. On superficial consideration this appears to satisfy theoretical requirements. But in fact and in truth there are innumerable processes of which we are feebly conscious for only a scarcely appreciable instant and which anon disappear from consciousness. Here and not in the strong and repeated "psychomes"—I beg your indulgence for this word, with which I would for the sake of brevity designate each and every psychic unit—are we to seek the transition from the conscious to the apparently unconscious. Even in this case, however, the feeble condition of consciousness is only apparent, because the inner reflex of these processes can merely echo faintly in the field of a strongly diverted attention. This, therefore, in no wise proves that such half conscious processes are in and for themselves so feebly represented in consciousness, since a flash of attention is sufficient subsequently to give them definite shape in consciousness. Only in consequence of the diversion of the attention do they lose more and more their connection with the chain of intensity-maxima which, under ordinary circumstances, constitute the remembered contents of our superconsciousness. The more feebly, however, they are bound to the latter, with the more difficulty are such half-conscious processes later associated anew through memory with the dominant chain. Of such a nature

are all dreams, all the subordinate circumstances of our lives, all automatised habits, all instincts. But if there exists between the clearly conscious and the unconscious, a half-conscious brain-life, whose consciousness appears to us so feeble merely on account of the deviation of our ordinary train of memories, this is an unequivocal indication that a step further on the remaining connection would be completely severed, so that we should no longer have the right to say that the brain-activities thus fading away nebulously from our superconsciousness do not have consciousness in and for themselves. For the sake of brevity and simplicity we will ascribe subconsciousness to these so-called unconscious brain-processes.

If this assumption is correct—and all things point in this direction—we are not further concerned with consciousness. It does not at all exist as such, but only through the brain-activity of which it is the inner reflex. With the disappearance of this activity, consciousness disappears. When the one is complicated, the other, too, is complicated. When the one is simple, the other is correspondingly simple. If the brain-activity be dissociated, consciousness also becomes dissociated. Consciousness is only an abstract concept, which loses all its substance with the falling away of "conscious" brain-activity. The brain-activity reflected in the mirror of consciousness appears therein subjectively as a summary synthesis, and the synthetical summation grows with the higher complications and abstractions acquired through habit and practice, so that details previously conscious (e. g., those involved in the act of reading) later become subconscious, and the whole takes on the semblance of a psychical unit.

Psychology, therefore, cannot restrict itself merely to a study of the phenomena of our superconsciousness by means of introspection, for the science would be impossible under such circumstances. Everybody would have only his own subjective psychology, after the manner of the old scholastic spiritualists, and would therefore be compelled to doubt the very existence of the external world and his fellow-men. Inference from analogy, scientific induction, the comparison of the experiences of our five senses, prove to us the existence of the outer world, our fellow-men and the psy-

chology of the latter. They also prove to us that there is such a thing as comparative psychology, a psychology of animals. Finally our own psychology, without reference to our brain-activity, is an incomprehensible patchwork full of contradictions, a patchwork which above all things seems to contradict the law of the conservation of energy.

It follows, furthermore, from these really very simple reflections that a psychology that would ignore brain-activity, is a monstrous impossibility. The contents of our superconsciousness are continually influenced and conditioned by subconscious brain-activities. Without these latter it can never be understood. On the other hand, we understand the full value and the ground of the complex organisation of our brain only when we observe it in the inner light of consciousness, and when this observation is supplemented by a comparison of the consciousness of our fellow-men as this is rendered possible for us through spoken and written language by means of very detailed inferences from analogy. The mind must therefore be studied simultaneously from within and from without. Outside ourselves the mind can, to be sure, be studied only through analogy, but we are compelled to make use of this the only method which we possess.

Some one has said that language was given to man not so much for the expression as for the concealment of his thoughts. It is also well known that different men in all honesty attribute very different meanings to the same words. A savant, an artist, a peasant, a woman, a wild Wedda from Ceylon, interpret the same words very differently. Even the same individual interprets them differently according to his moods and their context. Hence it follows that to the psychologist and especially to the psychiatrist—and as such I am here speaking—the mimetic expression, glances and acts of a man often betray his true inner being better than his spoken language. Hence also the attitudes and behavior of animals have for us the value of a "language," the psychological importance of which must not be underestimated. Moreover, the anatomy, physiology and pathology of the animal and human brain have yielded irrefutable proof that our mental faculties depend on

the quality, quantity, and integrity of the living brain and are one with the same. It is just as impossible that there should exist a human brain without a mind, as a mind without a brain, and to every normal or pathological change in the mental activity, there corresponds a normal or pathological change of the neurocymic activity of the brain, i. e., of its nervous elements. Hence what we perceive introspectively in consciousness is cerebral activity.

As regards the relation of pure psychology (introspection) to the physiology of the brain (observation of brain-activity from without), we shall take the theory of identity for granted so long as it is in harmony with the facts. The word identity, or monism, implies that every psychic phenomenon is the same real thing as the molecular or neurocymic activity of the brain-cortex coinciding with it, but that this may be viewed from two standpoints. The phenomenon alone is dualistic, the thing itself is monistic. If this were otherwise there would result from the accession of the purely psychical to the physical, or cerebral, an excess of energy which would necessarily contradict the law of the conservation of energy. Such a contradiction, however, has never been demonstrated and would hold up to derision all scientific experience. In the manifestations of our brain-life, wonderful as they undoubtedly are, there is absolutely nothing which contradicts natural laws and justifies us in postulating the existence of a mythical, supernatural "psyche."

On this account I speak of monistic identity and not of psychophysical parallelism. A thing cannot be parallel with itself. Of course, psychologists of the modern school, when they make use of this term, desire merely to designate a supposed parallelism of phenomena without prejudice either to monism or dualism. Since, however, many central nervous processes are accessible neither to physiological nor to psychological observation, the phenomena accessible to us through these two methods of investigation are not in the least parallel, but separated from one another very unequally by intermediate processes. Moreover, inasmuch as the dualistic hypothesis is scientifically untenable, it is altogether proper to start out from the hypothesis of identity.

It is as clear as day that the same activity in the nervous system of an animal, or even in my own nervous system, observed by myself, first by means of physiological methods from without, and second, as reflecting itself in my consciousness, must appear to me to be totally different, and it would indeed be labor lost to try to convert the physiological into psychological qualities or *vice versa*. We cannot even convert one psychological quality into another, so far as the reality symbolised by both is concerned; e. g., the tone, the visual and tactile sensation, which a uniform, low, tuning-fork vibration produces on our three corresponding senses. Nevertheless, we may infer inductively that it is the same reality, the same vibration which is symbolised for us in these three qualitatively and totally different modes; i. e., produces in us these three different psychical impressions which cannot be transformed into one another. These impressions depend on activities in different parts of the brain and are, of course, as such actually different from one another in the brain. We speak of psycho-physiological identity only when we mean, on the one hand, the cortical neurocyme which directly conditions the conscious phenomena known to us, on the other hand, the corresponding phenomena of consciousness.

And, in fact, a mind conceived as dualistic could only be devoid of energy or energy-containing. If it be conceived as devoid of energy (Wasmann), i. e., independent of the laws of energy, we have arrived at a belief in the miraculous, a belief which countenances the interference with and arbitrary suspension of the laws of nature. If it be conceived as energy-containing, one is merely playing upon words, for a mind which obeys the law of energy is only a portion of the cerebral activities arbitrarily severed from its connections and dubbed "psychic essence," only that this may be forthwith discredited. Energy can only be transformed qualitatively, not quantitatively. A mind conceived as dualistic, if supposed to obey the law of energy, would have to be transformed completely into some other form of energy. But then it would no longer be dualistic, i. e., no longer essentially different from the brain-activities.

Bethe, Uexkull, and others would require us to hold fast to

the physiological method, because it alone is exact and restricts itself to what can be weighed and measured. This, too, is an error which has been refuted from time immemorial. Only pure mathematics is exact, because in its operations it makes use solely of equations of abstract numbers. The concrete natural sciences can never be exact and are as unable to subsist without the inductive method of inference from analogy as a tree without its roots. Bethe and Uexkull do not seem to know that knowledge is merely relative. They demand absolute exactitude and cannot understand that such a thing is impossible. Besides, physiology has no reason to pride itself upon the peculiar exactitude of its methods and results.

Although we know that our whole psychology appears as the activity of our cerebrum in connection with the activities of more subordinate nerve-centers, the senses and the muscles, nevertheless for didactic purposes it may be divided into the psychology of cognition, of feeling and volition. Relatively speaking, this subdivision has an anatomico-physiological basis. Cognition depends, in the first instance, on the elaboration of sense-impressions by the brain; the will represents the psycho- or cerebrofugal resultants of cognition and the feelings together with their final transmission to the muscles. The feelings represent general conditions of excitation of a central nature united with elements of cognition and with cerebrofugal impulses, which are relatively differentiated and refined by the former, but have profound hereditary and phylogenetic origins and are relatively independent. There is a continual interaction of these three groups of brain-activities upon one another. Sense-impressions arouse the attention; this necessitates movements; the latter produce new sense-impressions and call for an active selection among themselves. Both occasion feelings of pleasure and pain and these again call forth movements of defense, flight, or desire, and bring about fresh sense-impressions, etc. Anatomically, at least, the sensory pathways to the brain and their cortical centers are sharply separated from the centers belonging to the volitional pathways to the muscles. Further on in the cere-

brum, however, all three regions merge together in many neurons of the cortex.

Within ourselves, moreover, we are able to observe in the three above-mentioned regions all varieties and degrees of so-called psychic dignity, from the simplest reflex to the highest mental manifestations. The feelings and impulses connected with self-preservation (hunger, thirst, fear) and with reproduction (sexual love and its concomitants) represent within us the region of long-inherited, profoundly phyletic, fixed, instinct-life. These instincts are nevertheless partially modified and partly kept within due bounds through the interference of the higher cerebral activities. The enormous mass of brain-substance, which in man stands in no direct relation to the senses and musculature, admits not only of an enormous storing up of impressions and of an infinite variety of motor innervations, but above all, of prodigious combinations of these energies among themselves through their reciprocal activities and the awakening of old, so-called memory images through the agency of new impressions. In contradistinction to the compulsory, regular activities of the profoundly phyletic automatisms, I have used the term "plastic" to designate those combinations and individual adaptations which depend on actual interaction in the activities of the cerebrum. Its loftiest and finest expression is the plastic imagination, both in the province of cognition and in the province of feeling, or in both combined. In the province of the will the finest plastic adaptability, wedded to perseverance and firmness, and especially when united with the imagination, yields that loftiest mental condition which gradually brings to a conclusion during the course of many years decisions that have been long and carefully planned and deeply contemplated. Hence the plastic gift of combination peculiar to genius ranks much higher than any simpler plastic adaptability.

The distinction between automatism and plasticity in brain-activity is, however, only a relative one and one of degree. In the most different instincts which we are able to influence through our cerebrum, i. e., more or less voluntarily, like deglutition, respiration, eating, drinking, the sexual impulse, maternal affection, jeal-

ousy, we observe gradations between compulsory heredity and plastic adaptability, yes, even great individual fluctuations according to the intensity of the corresponding hereditary predispositions.

Now it is indisputable that the individual Pithecanthropus or allied being, whose cerebrum was large enough gradually to construct from onomatopœas, interjections and the like, the elements of articulate speech, must thereby have acquired a potent means of exploiting his brain. Man first fully acquired this power through written language. Both developed the abstract concept symbolised by words, as a higher stage in generalisation. All these things give man a colossal advantage, since he is thereby enabled to stand on the shoulders of the written encyclopædia of his predecessors. This is lacking in all animals living at the present time. Hence, if we would compare the human mind with the animal mind, we must turn, not to the poet or the savant, but to the Wedda or at any rate to the illiterate. These people, like children and animals, are very simple and extremely concrete in their thinking. The fact that it is impossible to teach a chimpanzee brain the symbols of language proves only that it is not sufficiently developed for this purpose. But the rudiments are present nevertheless. Of course the "language" of parrots is no language, since it symbolises nothing. On the other hand, some animals possess phyletic, i. e., hereditarily and instinctively fixed cries and gesture, which are as instinctively understood. Such instinctive animal languages are also very widely distributed and highly developed among insects, and have been fixed by heredity for each species. Finally it is possible to develop by training in higher animals a certain mimetic and acoustic conventional language-symbolism, by utilising for this purpose the peculiar dispositions of such species. Thus it is possible to teach a dog to react in a particular manner to certain sounds or signs, but it is impossible to teach a fish or an ant these things. The dog comprehends the sign, not, of course, with the reflections of human understanding, but with the capacity of a dog's brain. And it is, to be sure, even more impossible to teach its young an accomplishment so lofty for its own brain as one which had to be acquired by training, than for the Wedda or even the negro to transmit his ac-

quired culture by his own impulse. Even the impulse to do this is entirely lacking. Nevertheless, every brain that is trained by man is capable of learning and profiting much from the experience of its own individual life. And one discovers on closer examination that even lower animals may become accustomed to some extent to one thing or another, and hence trained, although this does not amount to an understanding of conventional symbols.

In general we may say, therefore, that the central nervous system operates in two ways: *automatically* and *plastically*.

The so-called reflexes and their temporary, purposefully adaptive, but hereditarily stereotyped combinations, which respond always more or less in the same manner to the same stimuli, constitute the paradigm of automatic activities. These have the deceptive appearance of a "machine" owing to the regularity of their operations. But a machine which maintains, constructs, and reproduces itself is not a machine. In order to build such a machine we should have to possess the key of life, i. e., the understanding of the supposed, but by no means demonstrated, mechanics of living protoplasm. Everything points to the conclusion that the instinctive automatisms have been gradually acquired and hereditarily fixed by natural selection and other factors of inheritance. But there are also secondary automatisms or habits which arise through the frequent repetition of plastic activities and are therefore especially characteristic of man's enormous brain-development.

In all the psychic provinces of intellect, feeling, and will, habits follow the constant law of perfection through repetition. Through practice every repeated plastic brain-activity gradually becomes automatic, becomes "second nature," i. e., similar to instinct. Nevertheless instinct is not inherited habit, but phylogenetically inherited intelligence which has gradually become adapted and crystalised by natural selection or by some other means.

Plastic activity manifests itself, in general, in the ability of the nervous system to conform or adapt itself to new and unexpected conditions and also through its faculty of bringing about internally new combinations of neurocyme. Bethe calls this the power of modification. But since, notwithstanding his pretended issue with

anthropomorphism, he himself continually proceeds in an anthropomorphic spirit and demands human ratiocination of animals, if they are to be credited with plasticity (power of modification),—he naturally overlooks the fact that the beginnings of plasticity are primordial, that they are in fact already present in the Amœba, which adapts itself to its environment. Nor is this fact to be conjured out of the world by Loeb's word "tropisms."

Automatic and plastic activities, whether simple or complex, are merely relative antitheses. They grade over into each other, e. g., in the formation of habits but also in instincts. In their extreme forms they resemble two terminal branches of a tree, but they may lead to similar results through so-called convergence of the conditions of life (slavery and cattle-keeping among ants and men). The automatic may be more easily derived from the plastic activities than *vice versa*. One thing is established, however: since a tolerably complicated plastic activity admits of many possibilities of adaptation in the individual brain, it requires much more nervous substance, many more neurons, but has more resistances to overcome in order to attain a complicated result. The activities of an Amœba belong therefore rather to the plasticity of living molecules, but not as yet to that of coöperating nerve-elements; as cell-plasticity it should really be designated as "undifferentiated."[1] There are formed in certain animals specially complex automatisms, or instincts, which require relatively little plasticity and few neurons. In others, on the contrary, there remains relatively considerable nerve-substance for individual plasticity, while the instincts are less complicated. Other animals, again, have little besides the lower reflex centers and are extremely poor in both kinds of complex activities. Still others, finally, are rich in both. Strong so-called "hereditary predispositions" or unfinished instincts consti-

[1] If I expressly refrain from accepting the premature and unjustifiable identification of cell-life with a "machine," I nevertheless do not share the so-called vitalistic views. It is quite possible that science may sometime be able to produce living protoplasm from inorganic matter. The vital forces have undoubtedly originated from physico-chemical forces. But the ultimate nature of the latter and of the assumed material atoms is, of course, metaphysical, i. e., unknowable.

tute the phylogenetic transitions between both kinds of activity and are of extraordinarily high development in man.

Spoken and especially written language, moreover, enable man to exploit his brain to a wonderful extent. This leads us to underestimate animals. Both in animals and man the true value of the brain is falsified by training, i. e., artificially heightened. We overestimate the powers of the educated negro and the trained dog and underestimate the powers of the illiterate individual and the wild animal.

I beg your indulgence for this lengthy introduction to my subject, but it seemed necessary that we should come to some understanding concerning the validity of comparative psychology. My further task now consists in demonstrating to you what manner of psychical faculties may be detected in insects. Of course, I shall select in the first place the ants as the insects with which I am most familiar. Let us first examine the brain of these animals.

In order to determine the psychical value of a central nervous system it is necessary, first, to eliminate all the nerve-centers which subserve the lower functions, above the immediate innervation of the muscles and sense-organs as first centers. The volume of such neuron-complexes does not depend on the intricacy of mental work but on the number of muscle-fibres concerned in it, the sensory surfaces, and the reflex apparatus, hence above all things on the size of the animals. Complex instincts already require the intervention of much more plastic work and for this purpose such nerve-centers alone would be inadequate.

A beautiful example of the fact that complex mental combinations require a large nerve-center dominating the sensory and muscular centers is furnished by the brain of the ant. The ant-colony commonly consists of three kinds of individuals: the queen, or female (largest), the workers which are smaller, and the males which are usually larger than the workers. The workers excel in complex instincts and in clearly demonstrable mental powers (memory, plasticity, etc.). These are much less developed in the queens. The males are incredibly stupid, unable to distinguish friends from enemies and incapable of finding their way back to

their nest. Nevertheless the latter have very highly developed eyes and antennae, i. e., the two sense-organs which alone are connected with the brain, or supra-oesophageal ganglion and enable them to possess themselves of the females during the nuptial flight. No muscles are innervated by the supra-oesophageal ganglion. These conditions greatly facilitate the comparison of the perceptive organs, i. e., of the brain (*corpora pedunculata*) in the three sexes. This is very large in the worker, much smaller in the female, and almost vestigial in the male, whereas the optic and olfactory lobes are very large in the latter. The cortical portion of the large worker brain is, moreover, extremely rich in cellular elements. In this connection I would request you to glance at the figures and their explanation.

Very recently, to be sure, it has come to be the fashion to underestimate the importance of brain-morphology in psychology and even in nerve-physiology. But fashions, especially such absurd ones as this, should have no influence on true investigation. Of course, we should not expect anatomy to say what it was never intended to say.

In ants, injury to the cerebrum leads to the same results as injury to the brain of the pigeon.

In this place I would refer you for a fuller account of the details of sensation and the psychic peculiarities of insects to my more extended work above mentioned: *Sensations des Insects.*

It can be demonstrated that insects possess the senses of sight, smell, taste, and touch. The auditory sense is doubtful. Perhaps a sense of touch modified for the perception of delicate vibrations may bear a deceptive resemblance to hearing. A sixth sense has nowhere been shown to occur. A photodermatic sense, modified for light-sensation, must be regarded as a form of the tactile sense. It occurs in many insects. This sense is in no respect of an optic nature. In aquatic insects the olfactory and gustatory senses perhaps grade over into each other somewhat (Nagel), since both perceive chemical substances dissolved in the water.

The visual sense of the facetted eyes is especially adapted for seeing movements, i. e., for perceiving relative changes of position

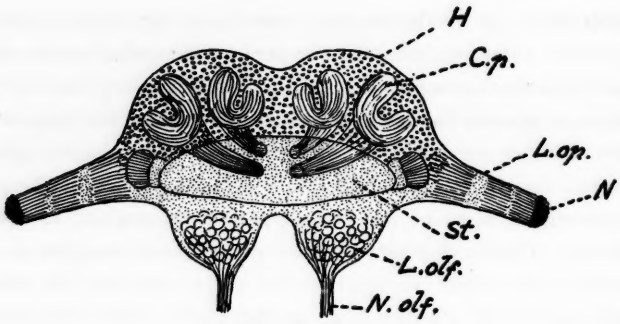

Fig. *W.*

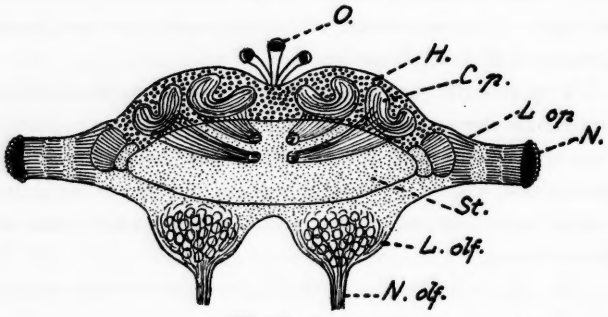

Fig. *F.*

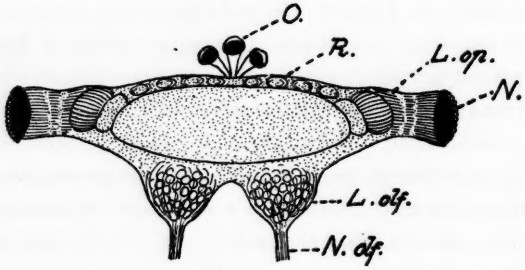

Fig. *M.*

EXPLANATION OF THE FIGURES.

Brain (supra-œsophageal ganglion) of an ant (*Lasius fuliginosus*), magnified 60 diameters, seen from above.

Fig. *W.* Brain of the Worker.

Fig. *F.* Brain of the Queen (Female).

Fig. *M.* Brain of the Male.

St. = Brain trunk. *L. op.* = Lobus opticus (optic lobe). *L. olf.* = Lobus olfactorius sive antennalis (olfactory lobe). *N.* = Facetted eye. *N. olf.* = Nervus olfac-

torius sive antennalis (olfactory nerve). *O.*=Ocelli, or simple eyes with their nerves (present only in the male and queen). *H.*=Cellular brain cortex (developed only in the worker and queen). *C. p.*=Corpora pedunculata, or fungiform bodies (developed only in the worker and queen). *R.*=Rudimental cortex of male.

The length of the whole ant is:

in the worker 4.5 mm;
in the queen 6.0 mm;
in the male 4.5 mm.

N. B. The striatim of the corpora pedunculata and their stems is represented diagrammatically, for the purpose of indicating rather coarsely their extremely delicate fibrillar structure.

in the retinal image. In flight it is able to localise large spatial areas admirably, but must show less definite contours of the objects than our eyes. The compound eye yields only a single upright image (Exner), the clearness of which increases with the number of facets and the convexity of the eye. Exner succeeded in photographing this image in the fire-fly (Lampyris). As the eyes are immovable the sight of resting objects soon disappears so far as the resting insect is concerned. For this reason resting insects are easily captured when very slowly approached. In flight insects orient themselves in space by means of their compound eyes. Odor, when perceived, merely draws these animals in a particular direction. When the compound eyes are covered, all powers of orientation in the air are lost. Many insects can adapt their eyes for the day or night by a shifting of the pigment. Ants see the ultra-violet with their eyes. Honey-bees and humble-bees can distinguish colors, but obviously in other tones than we do, since they cannot be deceived by artificial flowers of the most skilful workmanship. This may be due to admixtures of the ultra-violet rays which are invisible to our eyes.

The ocelli (simple eyes) play a subordinate rôle, and probably serve as organs of sight for objects situated in the immediate vicinity and in dark cavities.

The olfactory sense has its seat in the antennæ, usually in the club-shaped flagellum, or rather in the pore-plates and olfactory rods of these portions of the antennæ. On account of its external and moveable position at the tip of the antenna, the olfactory or-

gan possesses two properties which are lacking in the vertebrates, and particularly in man. These are:

1. The power of perceiving the chemical nature of a body by direct contact (contact-odor);

2. The power of space-perception and of perceiving the form of objects and that of the animal's own trail by means of odor, and the additional property of leaving associated memories.

The olfactory sense of insects, therefore, gives these animals definite and clear-cut perceptions of space-relations, and enables the animal while moving on the surface of the ground to orient itself with facility. I have designated this sense, which is thus qualitatively, i. e., in its specific energy, very different from our olfactory sense, as the topochemical (olfactory) sense. Probably the pore-plates are used for perceiving odor at a distance and the olfactory rods for contact-odor, but this is pure conjecture. Extirpation of the antennæ destroys the power of distinguishing friends from enemies and deprives the ant of the faculty of orienting itself on the ground and of finding its way, whereas it is possible to cut off three legs and an antenna without seriously impairing these powers. The topochemical sense always permits the ant to distinguish between the directions of its trail, a faculty which Bethe attributes to a mysterious polarisation. The ability to sense different odors varies enormously in different insects. An object possessing odor for one species is often odorless for other species (and for ourselves) and *vice versa.*

The gustatory organs are situated on the mouth-parts. Among insects the reactions of this sense are very similar to our own. Will accustomed some wasps to look in a particular place for honey, which he afterwards mixed with quinine. The wasps detected the substance at once, made gestures of disgust, and never returned to the honey. Mixing the honey with alum had the same result. At first they returned, but after the disagreeable gustatory experience they failed to reappear. Incidentally this is also a proof of their gustatory memory and of their powers of association.

Several organs have been found and described as auditory. But after their removal the supposed reaction to sounds persists.

This would seem to indicate that a deceptive resemblance to hearing may be produced by the perception of delicate vibrations through the tactile sense (Dugès).

The tactile sense is everywhere represented by tactile hairs and papillæ. It reacts more especially to delicate tremors of the atmosphere or soil. Certain arthropods, especially the spiders, orient themselves mainly by means of this sense.

It may be demonstrated that insects, according to the species and conditions of life, use their different senses in combination for purposes of orienting themselves and for perceiving the external world. Many species lack eyes and hence also the sense of sight. In others, again, the olfactory sense is obtuse; certain other forms lack the contact-odor sense (e. g., most Diptera).

It has been shown that the superb powers of orientation exhibited by certain aerial animals, like birds (carrier-pigeons), bees, etc., depend on vision and its memories. Movement in the air gives this sense enormous and manifold values. The semi-circular canals of the auditory organ are an apparatus of equilibrium in vertebrates and mediate sensations of acceleration and rotation (Mach-Breuer), but do not give external orientation. For the demonstration of these matters I must refer you to my work above-cited. A specific, magnetic, or other mode of orientation, independent of the known senses, does not exist.

The facts above presented constitute the basis of insect psychology. The social insects are especially favorable objects for study on account of their manifold reciprocal relationships. If in speaking of the bahavior of these animals I use terms borrowed from human psychology, I would request you, once for all, to bear in mind that these are not to be interpreted in an anthropomorphic but in an analogous sense.

The Realm of Cognition.—In the first place it can be shown that at least many insects (perhaps all, in a more rudimental condition) possess memory, i. e., they are able to store up sense-impressions in their brains for subsequent use. Insects are not merely attracted directly by sensory stimuli, as Bethe imagines. Huber, myself, Fabre, Lubbock, Wasmann, Von Buttel-Reepen, have demonstrated

this fact experimentally. That bees, wasps, etc., can find their way in flight through the air, notwithstanding wind and rain (and hence under circumstances precluding the existence of any possible odoriferous trail), and even after the antennæ have been cut off, to a concealed place where they have found what they desired, though this place may be quite invisible from their nest, and this even after the expiration of days and weeks, is a fact of special importance as proof of the above assertion. It can be shown that these insects recognise objects by means of their colors, their forms, and especially by their position in space. Position they perceive through the mutual relations and succession of the large objects in space, as these are revealed to them in their rapid change of place during flight in their compound eyes (shifting of retinal images). Especially the experiments performed by Von Buttel-Reepen and myself leave no doubt concerning this fact. Additional proof of a different nature is furnished by Von Buttel, who found that ether or chloroform narcosis deprives bees of all memory. By this means enemies can be converted into friends. Under these circumstances, too, all memory of locality is lost and must be reacquired by means of a new flight of orientation. An animal, however, certainly cannot forget without having remembered.

The topochemical antennal sense also furnishes splendid proofs of memory in ants, bees, etc. An ant may perform an arduous journey of thirty meters from her ruined nest, there find a place suitable for building another nest, return, orienting herself by means of her antennæ, seize a companion who forthwith rolls herself about her abductrix, and is carried to the newly selected spot. The latter then also finds her way to the original nest, and both each carry back another companion, etc. The memory of the suitable nature of the locality for establishing a new nest must exist in the brain of the first ant or she would not return, laden with a companion, to this very spot. The slave-making ants (*Polyergus*) undertake predatory expeditions, led by a few workers, who for days and weeks previously have been searching the neighborhood for nests of *Formica fusca*. The ants often lose their way, remain standing and hunt about for a long time till one or the other finds

the topochemical trail and indicates to the others the direction to be followed by rapidly pushing ahead. Then the pupæ of the *Formica fusca* nest, which they have found, are brought up from the depths of the galleries, appropriated and dragged home, often a distance of forty meters or more. If the plundered nest still contains pupæ, the robbers return on the same or following days and carry off the remainder, but if there are no pupæ left they do not return. How do the Polyergus know whether there are pupæ remaining? It can be demonstrated that smell could not attract them from such a distance, and this is even less possible for sight or any other sense. Memory alone, i. e., the recollection that many pupæ still remain behind in the plundered nest can induce them to return. I have carefully followed a great number of these predatory expeditions.

While Formica species follow their topochemical trail with great difficulty over new roads, they nevertheless know the immediate surroundings of their nest so well that even shovelling away the earth can scarcely disconcert them, and they find their way at once, as Wasmann emphatically states and as I myself have often observed. That this cannot be due to smelling at long range can be demonstrated in another manner, for the olfactory powers of the genus Formica, like those of honey-bees, are not sufficiently acute for this purpose, as has been shown in innumerable experiments by all connoisseurs of these animals. Certain ants can recognise friends even after the expiration of months. In ants and bees there are very complex combinations and mixtures of odors, which Von Buttel has very aptly distinguished as nest-odor, colony- (family-) odor, and individual odor. In ants we have in addition a species-odor, while the queen-odor does not play the same rôle as among bees.

It follows from these and many other considerations that the social Hymenoptera can store up in their brains visual images and topochemical odor-images and combine these to form perceptions or something of a similar nature, and that they can associate such perceptions, even those of different senses, especially sight, odor, and taste, with one another and thereby acquire spatial images.

Huber as well as Von Buttel, Wasmann, and myself have

always found that these animals, through frequent repetition of an activity, journey, etc., gain in the certainty and rapidity of the execution of their instincts. Hence they form, very rapidly to be sure, habits. Von Buttel gives splendid examples of these in the robber-bees, i. e., in some of the common honey-bees that have acquired the habit of stealing the honey from the hives of strangers. At first the robbers display some hesitation, though later they become more and more impudent. But he who uses the term habit, must imply secondary automatism and a pre-existing plastic adaptability. Von Buttel adduces an admirable proof of this whole matter and at the same time one of the clearest and simplest refutations of Bethe's innumerable blunders, when he shows that bees that have never flown from the hive, even though they may be older than others that have already flown, are unable to find their way back even from a distance of a few meters, when they are unable to see the hive, whereas old bees know the whole environment, often to a distance of six or seven kilometers.

It results, therefore, from the unanimous observations of all the connoisseurs that sensation, perception, and association, inference, memory and habit follow in the social insects on the whole the same fundamental laws as in the vertebrates and ourselves. Furthermore, attention is surprisingly developed in insects, often taking on an obsessional character and being difficult to divert.

On the other hand, inherited automatism exhibits a colossal preponderance. The above-mentioned faculties are manifested only in an extremely feeble form beyond the confines of the instinct-automatism stereotyped in the species.

An insect is extraordinarily stupid and inadaptable to all things not related to its instincts. Nevertheless I succeeded in teaching a water-beetle (*Dytiscus marginalis*) which in nature feeds only in the water, to eat on my table. While thus feeding, it always executed a clumsy flexor-movement with its fore-legs which brought it over on its back. The insect learned to keep on feeding while on its back, but it would not dispense with this movement, which is adapted to feeding in the water. On the other hand, it always attempted to leap out of the water (no longer fleeing to the bottom

of the vessel) when I entered the room, and nibbled at the tip of my finger in the most familiar manner. Now these are certainly plastic variations of instinct. In a similar manner some large Algerian ants which I transplanted to Zurich, learned during the course of the summer months to close the entrance of their nest with pellets of earth, because they were being persecuted and annoyed by our little *Lasius niger*. In Algiers I always saw the nest-opening wide open. There are many similar examples which go to show that these tiny animals can utilise some few of their experiences even when this requires a departure from the usual instincts.

That ants, bees, and wasps are able to exchange communications that are understood, and that they do not merely titillate one another with their antennæ as Bethe maintains, has been demonstrated in so many hundred instances, that it is unnecessary to waste many words on this subject. The observations of a single predatory expedition of Polyergus, with a standing still of the whole army and a seeking for the lost trail, is proof sufficient of the above statement. But, of course, this is not language in the human sense! There are no abstract concepts corresponding to the signs. We are here concerned only with hereditary, instinctively automatic signs. The same is true of their comprehension (pushing with the head, rushing at one another with wide-open mandibles, titillation with the antennæ, stridulatory movement of the abdomen, etc.). Moreover, imitation plays a great rôle. Ants, bees, etc., imitate and follow their companions. Hence it is decidedly erroneous (and in this matter Wasmann, Von Buttel, and myself are of but one opinion) to inject human thought-conception and human ratiocination into this instinct-language, as has been done to some extent, at least, even by Pierre Huber, not to mention others. It is even very doubtful whether a so-called general sensory idea (i. e., a general idea of an object, like the idea "ant," "enemy," "nest," "pupa") can arise in the emmet brain. This is hardly capable of demonstration. Undoubtedly perception and association can be carried on in a very simple way, after the manner of insects, without ever rising to such complex results. At any rate proofs of such

an assumption are lacking. But what exists is surely in itself sufficiently interesting and important. It gives us at least an insight into the brain-life of these animals.

Better than any generalisations, a good example will show what I mean.

Plateau had maintained that when Dahlia blossoms are covered with green leaves, bees nevertheless return to them at once. At first he concealed his Dahlias incompletely (i. e., only their ray-florets), afterwards completely, but still in an unsatisfactory manner, and inferred from the results that bees are attracted by odor and not by sight.

a. In a Dahlia bed visited by many bees and comprising about forty-three floral heads of different colors, I covered first seventeen and then eight at 2.15 P. M., September 10th, with grape-leaves bent around them and fastened with pins.

b. Of four I covered only the yellow disc;

c. Of one, on the other hand, I covered only the outer ray-florets, leaving the disc visible.

So many bees were visiting the Dahlias that at times there were two or three to a flower.

Result: Immediately all the completely covered flowers ceased to be visited by the bees. Dahlia (*c*) continued to be visited like those completely visible. The bees often flew to Dahlias (*b*) but at once abandoned them; a few, however, succeeded in finding the disc beneath the leaves.

Then as soon as I removed the covering from a red Dahlia the bees at once flew to it; and soon a poorly concealed specimen was detected and visited. Later an inquisitive bee discovered the entrance to a covered Dahlia from the side or from below. Thenceforth this bee, but only this one, returned to this same covered flower.

Nevertheless several bees seemed to be seeking the Dahlias which had so suddenly disappeared. Towards 5.30 o'clock some of them had detected the covered flowers. Thenceforth these insects were rapidly imitated by the other bees, and in a short time the hidden flowers were again being visited. As soon as a bee had

discovered my imposition and found the entrance to a hidden flower, she flew in her subsequent journeys, without hesitation to the concealed opening of the grape-leaf. As long as a bee had merely made the discovery by herself, she remained unnoticed by the others. When this was accomplished by several, however, (usually by four or five,) the others followed their example.

Plateau, therefore, conducted his experiments in a faulty manner and obtained erroneous results. The bees still saw the Dahlias which he at first incompletely concealed. Then, by the time he had covered them up completely, but only from above, they had already detected the fraud and saw the Dahlias also from the side. Plateau had failed to take into consideration the bee's memory and attention.

September 13th I made some crude imitations of Dahlias by sticking the yellow heads of Hieracium (hawkweed) each in a Petunia flower, and placed them among the Dahlias. Neither the Petunias nor the Hieracium had been visited by the bees. Nevertheless many of the honey and humble-bees flew at first to the artefacts in almost as great numbers as to the Dahlias, but at once abandoned the flowers when they had detected the error, obviously by means of their sense of smell. The same results were produced by a Dahlia, the disc of which had been replaced by the disc of a Hieracium.

As a control experiment I had placed a beautiful, odorous Dahlia disc among the white and yellow Chrysanthemums which had been neglected by the bees. For a whole half hour the bees flew by only a few centimeters above the disc without noticing it; not till then was it visited by a bee that happened to be followed by a second. From this moment the Dahlia disc which lay in the path of flight was visited like the others, whereas on the other hand the Petunia-Hieracium artefacts, now known to be fraudulent, were no longer noticed.

Plateau has demonstrated that artificial flowers, no matter how carefully copied from the human standpoint, are not noticed by insects. I placed artefacts of this description among the Dahlias. They remained in fact entirely neglected. Perhaps, as above sug-

gested, the bees are able to distinguish the chlorophyll colors from other artificial hues, owing to admixtures of the ultra-violet rays, or by some other means. But since Plateau imagines that the artificial flowers repel insects, I cut out, Sept. 19th, the following rather crude paper-flowers:

α. A red flower;

β. A white flower;

γ. A blue flower;

δ. A blue flower, with a yellow center made from a dead leaf;

ε. A rose-colored piece of paper with a dry Dahlia disc;

ζ. A green Dahlia leaf (unchanged).

It was nine o'clock in the morning. I placed a drop of honey on each of the six artefacts mounted among the Dahlias. For a quarter of an hour many bees flew past, very close to my artefacts but without perceiving and hence without smelling the honey. I went away for an hour. On my return artefact δ was without honey, and must therefore have been discovered by the bees. All the others had remained quite untouched and unnoticed.

With some difficulty I next undertook to bring artefact α very close to a bee resting on a Dahlia. But the attention of the bee was so deeply engrossed by the Dahlia that I had to repeat the experiment four or five times till I succeeded in bringing the honey within reach of her proboscis. The insect at once began to suck up the honey from the paper-flower. I marked the bee's back with blue paint so that I might be able to recognise her, and repeated the experiment with β and ε. In these cases one of the bees was painted yellow, the other white.

Soon the blue bee, which had in the meantime gone to the hive, returned, flew at once to α, first hovering about it dubiously, then to δ, where she fed, then again to α, but not to the Dahlias. Later the yellow bee returned to β and fed, and flew to α and δ where she again fed, but gave as little heed to the Dahlias as did the blue bee.

Thereupon the white bee returned seeking ε, but failing to find it, at once went to feeding on some of the Dahlias. But she tarried only a moment on each Dahlia as if tortured by the *idée fixe* of

honey. She returned to the artefacts, the perception of which, however, she was not quite able to associate with the memory of the honey flavor. At last she found a separate piece of ϵ, which happened to be turned down somewhat behind, and began lapping up the honey.

Thenceforth the three painted bees, and these alone, returned regularly to the artefacts and no longer visited the Dahlias. The fact is of great importance that the painted bees entirely of their own accord, undoubtedly through an instinctive inference from analogy, discovered the other artefacts as soon as their attention had been attracted by the honey on one of them, notwithstanding the fact that the artefacts were some distance from one another and of different colors. For were not the Dahlias, too, which they had previously visited, of different colors? Thus the blue bee flew to α, β, γ, and δ, the yellow to β, α, δ, and γ, the white ϵ, α, β, and δ. Matters continued thus for half an hour. The hidden green ζ was not found, evidently because it was indistinguishable from the green foliage.

Finally one bee, by herself, having had in all probability her attention attracted by the three others, came to δ and fed. I marked her with carmine. Thereupon she flew to α and drove the blue bee away. Another bee was attracted to ϵ of her own accord and was painted with cinnobar. Still another bee came by herself to β and was painted green. It was now 12.30 o'clock. The experiment had therefore lasted more than three hours, and during this time only six bees had come to know the artefacts, while the great majority still kept on visiting the Dahlias. But now the other bees began to have their attention attracted by the visitors to the artefacts. One, then two, then three, and finally more new ones followed, and I had not sufficient colors with which to mark them. Every moment I was obliged to replenish the honey. Then I went to dinner and returned at 1.25. At this moment seven bees were feeding on β, two on α, one on γ, three on δ, the white one alone on ϵ. More than half of all these were new, unpainted followers. Now a veritable swarm of bees threw themselves on the artefacts and licked up the last traces of the honey. Then for the first time,

after more than four hours, a bee from the swarm discovered the honey on the artefact ζ, which on account of its color had remained concealed up to this time!

As a pack of hounds throws itself on an empty skeleton, the swarm of bees, now completely diverted from the Dahlias, cast themselves on the completely empty artefacts and vainly searched every corner of them for honey. It was 1.55 P. M. The bees began to scatter and return to the Dahlias. Then I replaced α and β by a red and white paper respectively, which had never come in contact with honey and could not therefore smell of the substance. These pieces of paper, nevertheless, were visited and examined by various bees, whose brains were still possessed with the fixed idea of the flavor of honey. The white bee, e. g., investigated the white paper very carefully for a period of three to four minutes. There could, of course, be no such thing as an unknown force or attraction of odor, or brilliancy of floral colors. This fact can only be explained by an association of space, form, and color memories with memories of taste.

Thereupon I took all the artefacts in my left hand for the purpose of carrying them away. Two or three bees followed me, hovering about my left hand, and tried to alight on the empty artefacts. The space-image had changed and only the color and form could any longer be of service to the bees in their recognition of these objects.

This experiment is so clear and unequivocal that I mention it here among many others. It demonstrates:

1. The space, form, and color perceptions of the honey-bee. That these are possible only through the agency of the compound eyes is proved by other experiments (varnishing the eyes, extirpation of the antennæ, mouth-parts, etc.).

2. The memory of the honey-bee, in particular her visual and gustatory memory.

3. Her power of associating gustatory with visual memories.

4. Her ability instinctively to draw inferences from analogy: If she has once been offered honey in an artefact, she will investigate others, even those of a different color and hitherto unnoticed.

These she compares by means of the visual sense, since they are relatively similar, and recognises them as similar though such objects are most unusual in the bee's experience.

5. Her poor olfactory sense, which is useful only at very close range.

6. The onesidedness and narrow circle of her attention.

7. The rapid formation of habits.

8. The limits of imitation of bees by one another.

Of course, I should not allow myself to draw these conclusions from a single experiment, if they had not been confirmed by innumerable observations by the ablest investigators in this field. Lubbock showed clearly that it is necessary to train a bee for some time to go to a particular color if one wishes to compel her to pay no attention to other colors. This is the only way in which it is possible to demonstrate her ability to distinguish colors. My bees, on the contrary, had been trained on differently colored objects (Dahlias and artefacts) and therefore paid no attention to differences in color. It would be a fallacy to conclude from this that they do not distinguish colors. On the contrary, by means of other experiments I have fully confirmed Lubbock's results.

By 2.20 P. M. all of my bees, even the painted ones, had returned to the Dahlias.

On September 27, a week later, I wished to perform a fresh experiment with the same bees. I intended to make them distinguish between differently colored discs, placed at different points on a long scale, representing on a great sheet of paper, varying intensities of light from white through gray to black. First, I wished to train a bee to a single color. But I had calculated without the bee's memory, which rendered the whole experiment impracticable. Scarcely had I placed my paper with the discs on the lawn near the Dahlia bed, and placed one or two bees on the blue discs and marked them with colors, when they began to investigate all the red, blue, white, black and other discs with or without honey. After a few moments had elapsed, other bees came from the Dahlia bed and in a short time a whole swarm threw itself on the paper discs. Of course, those that had been provided with honey were most vis-

ited, because they detained the bees, but even the discs without honey were stormed and scrutinised by bees following one another in their flight. The bees besieged even the paint-box. Among these there was one that I had previously deprived of her antennæ. She had previously partaken of the honey on the blue discs and had returned to the hive. This bee examined the blue piece of paint in the color-box.

In brief, my experiment was impossible, because all the bees still remembered from a former occasion the many-colored artefacts provided with honey, and therefore examined all the paper discs no matter of what color. The association between the taste of the honey and the paper discs had been again aroused by the sight-perception of the latter, and had acquired both consistency and rapid and powerful imitation, because honey happened to be actually found on some of the discs.

Together with the perceptive and associative powers, the power of drawing simple, instinctive inferences from analogy is also apparent. Without this, indeed, the operation of perception and memory would be inconceivable! We have just given an example. I have shown on a former occasion that humble-bees, whose nest I had transferred to my window, when they returned home often confounded other windows of the same façade and examined them for a long time before they discovered the right one. Lubbock reports similar facts. Von Buttel shows that bees that are accustomed to rooms and windows, learn to examine the rooms and windows in other places, i. e., other houses. When Pissot suspended wire netting with meshes twenty-two mm. in diameter in front of a wasp nest, the wasps hesitated at first, then went around the netting by crawling along the ground or avoided it in some other way. But they soon learned to fly directly through the meshes. The sense of sight, observed during flight, is particularly well adapted to experiments of this kind, which cannot therefore be performed with ants. But the latter undoubtedly draw similar inferences from the data derived from their topochemical antennal sense. The discovery of prey or other food on a plant or an ob-

ject induces these insects to examine similar plants or objects and to perform other actions of a like nature.

There are, on the other hand, certain very stupid insects, like the males of ants, the Diptera and may-flies (Ephemerids) with rudimental brains, incapable of learning anything or of combining sense-impressions to any higher degree than as simple automatisms, and without any demonstrable retention of memory-images. Such insects lead a life almost exclusively dominated by sensory stimuli; but their lives are adapted to extremely simple conditions. In these very instances the difference is most striking, and they demonstrate most clearly through comparison and contrast the *plus* possessed by more intelligent insects.

The Realm of the Will. The notion of volition, in contradistinction to the notion of reflex action, presupposes the expiration of a certain time interval and the operation of mediating and complex brain-activities between the sense-impression and the movement which it conditions. In the operation of the purposeful automatisms of instinct which arouse one another into activity in certain sequences, there is also a time interval, filled out by internal, dynamic brain-processes as in the case of the will. Hence these are not pure reflexes. They may for a time suffer interruption and then be again continued. But their operation is brought about in great measure by a concatenation of complicated reflexes which follow one another in a compulsory order. On this account the term automatism or instinct is justifiable.

If we are to speak of will in the narrower sense, we must be able to establish the existence of individual decisions, which can be directed according to circumstances, i. e., are modifiable, and may, for a certain period, remain dormant in the brain to be still performed notwithstanding. Such volition may be very different from the complex volition of man, which consists of the resultants of prodigiously manifold components that have been long preparing and combining. The ants exhibit positive and negative volitional phenomena, which cannot be mistaken. The ants of the genus Formica Linné are particularly brilliant in this respect, and they also illustrate the individual psychical activities most clearly. The

above-mentioned migrations from nest to nest show very beautifully the individual plans of single workers carried out with great tenacity. For hours at a time an ant may try to overcome a multitude of difficulties for the purpose of attaining an aim which she has set herself. This aim is not accurately prescribed by instinct, as the insect may be confronted with several possibilities, so that it often happens that two ants may be working in opposition to each other. This looks like stupidity to the superficial observer. But it is just here that the ant's plasticity reveals itself. For a time the two little animals interfere with each other, but finally they notice the fact, and one of them gives in, goes away, or assists the other.

These conditions are best observed during the building of nests or roads, e. g., in the horse-ant (*Formica rufa*) and still better in *F. pratensis*. It is necessary, however, to follow the behavior of a few ants for hours, if one would have a clear conception of this matter, and for this much patience and much time are necessary. The combats between ants, too, show certain very consistent aims of behavior, especially the struggles which I have called chronic combats (*combats à froid*). After two parties (two colonies brought together) have made peace with each other, one often sees a few individuals persecuting and maltreating certain individuals of the opposite party. They often carry their victims a long distance off, for the purpose of excluding them from the nest. If the ant that has been borne away returns to the nest and is found by her persecutrix, she is again seized and carried away to a still greater distance. In one such case in an artificial nest of a small species of Leptothorax, the persecuting ant succeeded in dragging her victim to the edge of my table. She then stretched out her head and allowed her burden to fall on the floor. This was not chance, for she repeated the performance twice in succession after I had again placed the victim on the table. Among the different individuals of the previously hostile, but now pacified opposition, she had concentrated her antipathy on this particular ant and had tried to make her return to the nest impossible. One must have very strong preconceived opinions if in such and many similar cases one would

maintain that ants are lacking in individual decision and execution. Of course, all these things happen within the confines of the instinct-precincts of the species, and the different stages in the exetion of a project are instinctive. Moreover, I expressly defend myself against the imputation that I am importing human reflection and abstract concepts into this volition of the ant, though we must honestly admit, nevertheless, that in the accomplishment of our human decisions both hereditary and secondary automatisms are permitted to pass unnoticed. While I am writing these words, my eyes operate with partially hereditary, and my hand with secondary automatisms. But it goes without saying that only a human brain is capable of carrying out my complex innervations and my concomitant abstract reflections. But the ant must, nevertheless, associate and consider somewhat in a concrete way after the manner of an ant, when it pursues one of the above-mentioned aims and combines its instincts with this special object in view. While, however, the instinct of the ant can be combined for only a few slightly different purposes, by means of a small number of plastic adaptations or associations, individually interrupted in their concatenation or *vice versa*, in the thinking human being both inherited and secondary automatisms are only fragments or instruments in the service of an overwhelming, all-controlling, plastic brain-activity. It may be said incidentally that the relative independence of the spinal chord and of subordinate brain-centers in the lower animals (and even in the lower mammals) as comparcd with the cerebrum, may be explained in a similar manner if they are compared with the profound dependence of these organs and their functions on the massive cerebrum in man and even to some extent in the apes. The cerebrum splits up and controls its automatisms (*divide et impera*).

While success visibly heightens both the audacity and tenacity of the ant-will, it is possible to observe after repeated failure or in consequence of the sudden and unexpected attacks of powerful enemies a form of abulic dejection, which may lead to a neglect of the most important instincts, to cowardly flight, to the devouring or casting away of offspring, to neglect of work, and similar condi-

tions. There is a chronically cumulative discouragement in degenerate ant-colonies and an acute discouragement when a combat is lost. In the latter case one may see troops of large powerful ants fleeing before a single enemy, without even attempting to defend themselves, whereas the latter a few moments previously would have been killed by a few bites from the fleeing individuals. It is remarkable how soon the victor notices and utilises this abulic discouragement. The dejected ants usually rally after the flight and soon take heart and initiative again. But they offer but feeble resistance, e. g., to a renewed attack from the same enemy on the following day. Even an ant's brain does not so soon forget the defeats which it has suffered.

In bitter conflicts between two colonies of nearly equal strength the tenacity of the struggle and with it the will to conquer increases till one of the parties is definitively overpowered. In the realm of will imitation plays a great rôle. Even among ants protervity and dejection are singularly contagious.

(TO BE CONCLUDED.)

AUGUST FOREL.

ZURICH, SWITZERLAND.

BEL, THE CHRIST OF ANCIENT TIMES.

IT is admitted by every one who has studied the religion of the Babylonians, that it is from the first to the last *polytheistic*. If we were to take the trouble of counting together the Babylonian divinities occurring in the inscriptions and especially in the several "lists of gods," we would get nearly as many as 500–1000 different gods. This state of affairs is indeed annoying for one who tries to understand such a "theological system." The difficulty is, however, still more increased, not only by the various *identifications* of one god with another, but especially by the so-called different *genealogies* of one and the same divinity. Take, e. g., the goddess ISHTAR! She appears in one inscription as the daughter of the moon-god, *Sin*;[1] in another as that of the god *Anu*,[2] in a third as a child of *Anshar* or *Ashshur*,[3] in a fourth as that of *Bel*,[4] in a fifth as a child of *Nin-ib*,[5] thus being considered not only as a daughter of Bel, but also

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[1] *ilu Ishtar* (SUCH) *mârat* (dumu-sal) *ilu Sin* (ESH), Ishtar's descent, *Keilinschriftliche Bibliothek* (=K. B.) VI[1]. p. 80, 2 *et passim*.

[2] *illik mârat Anim ana pân Bêl abtsha* = the daughter of Anu went to Bêl her father. IV. R. 65, col. II. 32; Jensen, *Kosmologie*, p. 273.

[3] *Anshar* (= Ashshur)....*ba-nu-ú ilâni*[pl] *mu-al-lid ilu Ish-tar* = Anshar, the creator of the gods, the begetter of Ishtar. Craig, *Religious Texts*, Vol. I. p. 32, 16.

[4] See note 2 above.

[5] As such she is known under the name *É-gi-a*, which means, according to Haupt, S. A. K. T. p. 214, 11 = *kal-la-a-tu* = "bride." *É-gi-a dumu-sag dingir IB-A*: Reisner, *Hymnen*, pp. 132, 44; 79, 14; 56, 10; IV. R. 21, No. 2, Rev. 54; Craig, R. T., I. p. 20, 28 is therefore translated by: *kal-lat mar-tum resh-ti-tum sha ilu Nin-[ib]*, i. e., "the bride, the principal daughter of Ninib," Reisner, *loc. cit.*, p. 65, 13. This latter passage proves also *dingir IB-A* is = *ilu Nin-ib*, who changes again with *dingir IB* in Zimmern, *Ritualtafeln*, No. 26, col. III. 48, 49, where *dingir IB* is called the *gash-ru bu-kur ilu Bêl* (*dingir BE*), i. e., "the mighty,

as a daughter of the first-born of Bel, for *Ninib* himself is a son of Bel.[1] Furthermore, the divinity ^{ilu}*SUCH* is not only = Ishtar,[2] but also = Ninib himself,[3] nay, even = ^{dingir}*Lugal-banda*,[4] the god of Eshnunna, and husband of ^{dingir}*Nun-sun*, his wife. Ishtar is also = *An-tum*, the wife of Anu,[5] and as such = ^{ilu}*Nin-shar*,[6] who again is the "thunderbolt carrier of *Nin-Girsu*,"[7] or of the *É-kur*.[8] Yes, Ishtar has become even a common name for "goddess," and suffered to have a plural form "Ishtarâte" = goddesses.[9] Not very much better is it with god NUSKU (PA+KU). In one and the same sentence, he is called: "The one begotten by Anu," the "firstborn of Enlil," the "sprout of the ocean," the "creature of the lord of heaven and earth.[10]

In another inscription he appears as the "son of É-kur," the great one, who like Nannar (the moon-god).... busies himself with

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the first-born of Bel." The title *kallâtu*, "bride," is not only borne by (*a*) *Ishtar* but also by (*b*) ^{ilu} *A-a*, the *é-gi-a rabîtu*, V. R. 65, 19*b*, who as such is identified not only with the Ishtar Annunit of Sippar, the wife of Shamash, the sun-god: V. R. 61, 5*b*; 40*b*; 65, 35*a*, etc., but even with Shamash himself: II. R. 57, 15*a*; (*c*) by *Tashmetum*, the wife of Nabû; IV. R. 59, 41*b*; Zimmern, *Shurpu*, II. 157: *kal-la-tum rabî-tum*, "the great bride." Here Tashmetum is mentioned in close connection with ^{ilu} *Na-na-a*, who in *loc. cit.* l. 156 is directly coupled with Nabû, while in l. 197 it is Tashmetum again who is mentioned with Nabû. Hence Tashmetum = Nanâ! (*d*) *Tsarpanitnm*: ^{ilu}*Tsar-pa-ni-tum be-el-tum rabî-tum chirat* ^{ilu}*En-bi-lu-lu ka-lat* ^{ilu}*Nu-*[*gim-mut*], i. e., the great mistress, the wife of Enbilulu (= Marduk, see Reisner, *Hymnen*, pp. 53, 19; 46, 10: *umun* ^{dingir}*En-bi-lu-lu dumu-sag* ^{dingir}*En-ki-ge*; cf. also Reisner, *loc. cit.*, 138, 118), the kallat of Nugimmut, Craig, R. T., I. p. 31, 22, cf. l. 16.

[1] See preceding note.

[2] See above note 1.

[3] II. R. 57*b*, Rev. 35: $^{dingir(ti\text{-}ish\text{-}chu)}$*SUCH* = dito (i. e., ^{ilu} *Nin-îb*) *sha ra-am-ku-ti*, i. e., ^{dingir} *SUCH*, when pronounced Tishchu, is the god Ninib of "the pouring out," or better of "the washing, cleansing, himself" (Jensen, K. B. VI^{1}. p. 365).

[4] See my forthcoming article on Jahveh.

[5] Hence his daughter *and* his wife!

[6] II. R. 54, No. 3, l. 19.

[7] See my *Creation Story*, (=C. S.) p. 44, note 1, and p. 46.

[8] Reisner, *Hymnen*, pp. 137, 44; 134, col. I. 31.

[9] See Delitzsch, *Handwörterbuch*, p. 154*a*. This is the reason why Ishtar may signify almost any goddess.

[10] *Nusku shurbû ilidti* ^{ilu}*A*[*nim*] *tamshil abi bukur* ^{ilu}*Bêl* (= *Enlil*) *tarbît apsî binût* ^{ilu}*En-an-ki*: IV. R^{2}. 49 [56], 15*b*, ff. See Jensen, *Kosmologie*, p. 273,

the command of the "Enlilship," who guardeth the mystery.[1] In a third he is called the "son of the thirtieth day of the month.[2] In a fourth he is designated "the great one, the one begotten by *Dur-an-ki.*"[3] He is identified not only with Nergal,[4] the god of the nether world, whose "day of death" was celebrated on the twenty-eighth of a month,[5] but also with *dingir BIL-GI*, resp. *dingir GISH-BAR*, etc., etc.

Provoking as such genealogies might seem at the first glance, yet, we will have to admit, that they had, yes, must have had and still have a *reason.* If, therefore, we want to bring light into this chaos, we cannot do it by ridiculing[6] these genealogies, nor by building up, first of all, a theory of our own and then try to fit and force the different gods into our theory,[7] but we always and under all circumstances must maintain the accuracy of these "contradictory" genealogies and explain them by other passages of the Cuneiform Literature, which may help us to the right understanding of

[1] *Mâr* (*dumu-ush*) *É-kur shur-bu-ú sha ki-ma* ^{du}*URU-KI-ri* (= Nannar-ri!) ....*mut-tab-bil pa-ra-ats* ^{du}*EN-LIL-ú-ti na-tsir pi-r*[*is-ti*]. Craig, *Religious Texts*, I., p. 35, obv. 7, 8. Zimmern, *Keilinschriften und das Alte Testament* (= K. A. T.[3]), p. 416, note 3, wants to find in this inscription the statement that Nusku is also the son of Sin! The reading *dlidishu*, which he finds in the Rev. l. 6 f., is—at least according to Craig's copy—not justified!

[2] IV. R[2]. 23, 3 f.

[3] K. 3285, Bezold, *Catalogue*, p. 520: ^{du}*PA+KU shur-bu-ú i-lid-ti Dur-an-ki.*

[4] See *Cossæan Vocabulary.*

[5] IV. R. 33, 33. From these latter three references Jensen (K. B. VI[1]. pp. 413 and 466) concludes that Nusku = Nergal, the former being the *Neumondsichel*, the latter the *abnehmender Mond*,—a conclusion which I am willing to accept with the following reserve: Nusku = Nergal is = SIN or Nin-Girsu. As Nin-Girsu was the chief messenger of Enlil, so *dingir Nusku lugh-magh dingir En-lil-lal* (E B. H. 223, 3), i. e., "the exalted ambassador of Enlil," originally = Nin-Girsu, became, when Sin was made the highest god of the Babylonian pantheon, thus being identified with Enlil (*Creation Story*, p. 50), his (Sin's) messenger. And as the מלאך יהוה was identified with יהוה, so was Nin-Girsu with Enlil, and Nusku or Nergal with Sin,—hence Nusku's worship in the temple of the moon-god at Harran, Inscript. of Nabû-nâ'id, K. B. III[2]. p. 101, col. II. 18, 42. But the messenger of a god is always his son! Hence Nusku or Nergal, the messenger of Sin, *had* to become also his (Sin's) son. The son of Sin (or ZU) is Shamash (or UD), thus it happened that Nergal (= Nusku) was said to be = Shamash, see Sp. I. 131 (*Zeitschrift für Assyriologie*, VI. p. 241) l. 52 ff.; Zimmern, K. A. T[3]. p. 388.

[6] As Jensen, K. B. VI[1]. 319, 320; *Kosm.* 273 does it.

[7] As is done by Barton, *Sketch of Semitic Origins.*

the nature of the god in question. If in course of such an investigation we come to understand his nature and his essence correctly, we also will and must be able to account for his genealogy, even if it were the most contradictory.

That so many different genealogies of one and the same god do exist in the religious doctrines of the Babylonians, is, no doubt, due to the various elements to be found in the Babylonian population. The little valley between the Tigris and the Euphrates was since the "dawn of history" the land which, on account of its fertility, almost all the nations of the ancient world tried to possess and actually did possess. In the inscriptions discovered in this valley we find mentioned, besides the specific Semitic-Babylonian, also Persian, Aramæan, Arabic, Hittite, Elamitic, Cossæan, Canaanitish, and Sumerian gods. A religion of the Babylonians must, therefore, be primarily a *history* of their religion; and if the investigator ignores such a historic development, his results must be pronounced, from the very first, a failure.

It is not my intention to give such a history of the Babylonian religion here—the material so far accessible to scholars would prevent me from doing this—but I want to show by a few examples that we are still able to bring some light into the chaos, if we study the religion historically.

To put it briefly, we may say that the religion of the Babylonians may be divided into three epochs:

I. *The Sumerian*, embodying in it the oldest so-called "Semitic-Babylonian" religious elements. What these latter are or were, we cannot tell as yet. It would seem, however, that the oldest Semitic religious ideas, as expressed in the inscriptions, were in all essentials and particulars the same as those of the Sumerians, i. e., the so-called Semitic-Babylonians seem to have adopted the Sumerian pantheon "in toto" without any perceptable admixture of their own.

II. The *Canaanitish* epoch. This began at about 3000 B. C.[1]

[1] Shortly before the "kings of Ur and of the four quarters of the world." The inscriptions of these kings distinguish very often between the "*Nippurian* Enlil or Bel" and another, i. e., probably Marduk or possibly Dagan.

when the Canaanites invaded Babylonia. At the time of Hammurabi, at about 2200 B. C., they are masters of the whole of Babylonia. Their own specific god has become the god κατ' ἐξοχήν. These Canaanites made Babylon their capital. Their god became thus the city-god of Babylon, and when, in course of time the whole of Babylonia had been subjugated, the city-god of Babylon became the "god of Babylonia." We may call, therefore, this epoch, also the *Babylonian* epoch.

III. The *Assyrian.* During this time we find nearly all the characteristics, not only of the Sumerian but also of the Babylonian period, with this exception, however, that the specific god of the Assyrians is put at the head of the pantheon and worshipped in the royal capital of the Assyrian kings.

The god of the first epoch was *Enlil*, that of the second *Amar-ud or Marduk*, that of the third *An-shar*, which name was read at this time *Ashshur*. As Marduk displaced Enlil, so did Anshar displace Marduk. Such a "*displacing*," however, was only one in "*name*,"[1] not in essence, i. e., simply the name of the new victorious god was substituted for that of the old conquered god. Thus it happened that the attributes, genealogy, court, servants, etc., etc., of the conquered god were added to those of the victorious god, to whose glory, power, and honor they were thought to contribute greatly. Thus we get the strange phenomenon, that one and the same god may have *two* genealogies, two different kinds of servants, etc. In a historic investigation, such a phenomenon will always have to be kept in mind, and the question will have to be asked and answered: What genealogy belongs to the god *originally*, and what was *transferred* to him? That such questions can be answered only by taking into consideration the *historic development* of the Babylonian religion, is, of course, self-evident. As times went on, the attempt was made to harmonise or better identify such two originally very different genealogies. The result of such harmonising or identification was that, e. g., the father of the conquered god was made to be the same as the father of the victorious, at that

[1] See also my remarks with regard to the change of the name of El-shaddai into that of Jahveh, *Creation-Story*, p. 58.

time reigning, god, and so on. The outcome of such an attempt was finally not merely henotheism but an almost pure monotheism.

Not only, however, were the attributes of the Sumerian Enlil transferred to Marduk resp. Anshar or Ashshur, but even the very name "Enlil" became a title of these latter gods—a title, which, is generally transcribed and read bêl, i. e., "lord," but which still betrays to us the fact that Marduk[1] as well as Anshar played the rôle of Enlil, nay, were in all particulars—even with regard to their respective genealogies—identified with him. In a hymn, written at the time of Ashshur-bân-apal, King of Assyria, Ashshur is addressed as follows:[2]

1. "The great one, the hero of the gods, the omniscient,
2. "The esteemed one, the glorious one, the *En-lil-lal* of the gods, he who determines the fates,
3. "An-shar (=Ashshur), the great lord, the omniscient,
4. "The esteemed one, the glorious one, the *En-lil-lal* of the gods, he who determines the fates
5. "[ ] An-shar, the powerful one, the hero of the gods, the *lord of the lands.*"

In the very same hymn we further learn, that Ashshur has his abode in *É-char-sag-gal-kur-kur-ra*,[3] i. e., in the "house of the great mounain of the lands, or in the *É-shar-ra*, i. e., "the house of the totality."[4] He is "the creator of AN-NA, the builder of the forests,"[5] "the creator of the gods, the one who begot Ishtar."[6] His lordship is glorified by Anu, Enlil, Ea, Bêlit-ilî, the Igigi, and the Anunnaki in the Ubshugina, i. e., the place or room of the assem-

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[1] C. S. p. 69.

[2] 1. *shur-bu-ú e-til ilâni^{meš} mu-du-ú ka-la-ma*
2. *kab-tu shú-tu-qu ^{ilu}EN-LIL-LAL ilâni^{meš} mu-shim shi-ma-a-ti*
3. *An-shar bêlu shur-bu-ú mu-du-ú ka-la-ma*
4. *kab-tu shú-tu-qu ^{ilu}EN-LIL-LAL ilâni^{meš} mu-shim shi-ma-a-ti*
5. [ ]*-bi An-shar dan-dan-nu e-til ilâni^{meš} be-el ma-ta-a-ti.*
Craig, *Rel. Texts.*, I. p. 32, 1–5.

[3] [*ilu a*]*-shîb É-char-sag-gal-kur-kur-ra*, Craig, *loc. cit.*, l. 8.

[4] [*ilu a*]*-shîb É-shar-ra An-shar mu-shim shîmâti^{meš}*. Craig, *loc. cit.*, l. 10.

[5] [*ilu*] *ba-nu-ú shu-ut AN-*[*N*]*A* (*!*) *pa-ti-qu chur-sha-a-ni.* Craig, *loc. cit.*, l. 15. For AN-NA see below!

[6] [*ilu*] *ba-nu-ú ilâni* [^{me}]^{eš} *mu-al-lid ^{ilu}Ish-tar.* Craig, *loc. cit.*, l. 16.

bling hand."[1] Similar are Anshar's titles in a prayer of Sinacherib (?), where we read:[2]

1. "To Ashshur, the king of the totality of the gods, to him who begot himself,[3] the father of the gods.
2. Who prosper by his hand in the abyss,[4] the *king of heaven and earth*,
3. The lord of all the gods, to him who begot[5] the Igigi and the Anunnaki,
4. Who built the heaven of Anu and the "great place," who made all men,[6]
5. Who inhabiteth the bright heavens, the *Enlil of the gods*, who determines the fates,
6. Who dwelleth in É-shar-ra, which is in Ashshur, the great lord, his lord."

Not satisfied with this, the Assyrians went still a step farther. If Anshar be equal to Enlil, be indeed identical with him, then, it was quite natural for them that they should consider Ninlil, the wife of Enlil, to be also Anshar's wife. Sinacherib, when praying to Anshar, includes in his supplication also an address to the wife of Anshar, whom he calls:

"Nin-lil, queen of É-shar-ra, wife of Anshar, who created the great gods."[7]

These passages will suffice to prove that Anshar or Ashshur is in all respects the same as Enlil, whose name he even received.

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[1] [^{ilu}A]-*nu* ^{ilu}*EN-LIL* ^{ilu}*É-a* ^{ilu}*Be-lit-ili* ^{mesh} *u* ^{ilu}[*Igigi u* ^{ilu}*Anunnaki*] *shá An-shar ina Ub-shú-ka(!)-na-ki it-ta-a'-i-du bêlu* (=*en*)-*us-su*. Craig, *loc. cit.*, p. 34, 6, 7.

[2] 1. *a-na An-shar shar kish-shat ilâni*^{mesh} *ba-nu-u ram-ni-shu ab*(=*ad*) *ilâni*^{mesh}.
2. *shá ina apsî ish-mu-chu qat-tu-ush shar shamê*^{e} *u irtsitim*^{tî}[^{m}]
3. *bêl ilâni*^{mesh} *ka-la-ma sha-pi-ik* ^{ilu}*Igigi* (=*V* + *II.*) *u* ^{ilu}*A-nun-na-*[*ki*].
4. *pa-ti-iq sa-mi* ^{ilu}*A-nim u ki-gal-li e-pish kul-lat da-ad-me*
5. *a-shîb bu-ru-mu ellûti*^{mesh} ^{ilu}*EN-LIL ilâni*^{mesh} *mu-shim shimâti*^{mesh}.
6. *a-shib É-shar-ra sha ki-rib Ashshur* (=*BAL-BAT*)^{ki} *bêli rabî*^{e} *bêli-shu*.
—Craig, *loc. cit.*, I., p. 83, 1–6.

[3] Ashur is here without father and mother, the self-existing god.

[4] I. e., the Anunnaki.

[5] Lit.= "poured out" = *râchû*. The Igigi and the Anunnaki are repeatedly called the *richût* ^{ilu}*Anim*, i. e., "the outpouring" = seed of Anu. For this signification of *rachû* see Jensen, K. B. VI[1]. pp. 365 ff. 513.

[6] Or human habitations.

[7] ^{ilu}*NIN-LIL shar-rat É-shar-ra chi-rat An-shar ba-nit ilâni*^{mesh} *rabûti*^{mesh}, Craig, *Rel. Texts*, I., p. 77, 10.

Both are "the father and god of the gods,"[1] the "king of the gods," "the king of heaven and earth," the "creator of all mankind";[2] both have the same wife: Nin-lil.[3] We may make therefore the equation:

Anshar = Enlil = Ashshur

Ninlil = Bêlit = Ishtar.

Anshar has his abode in É-char-sag-gal-kur-kur-ra or in É-shar-ra; Ninlil, his wife, dwells in É-shar-ra; Enlil of the Sumerians dwells in É-kur. If Anshar and his wife be the same as Enlil and his wife, it would follow that their respective habitations—their temples, which here, as in all other cases, stand for a certain definite cosmic quantity—are also the same, i. e., that the cosmic É-char-sag-gal-kur-kur-ra or É-shar-ra be = the cosmic É-kur. If É-kur, "the mountain-house," be the realm of Enlil, and if Enlil be the king of "heaven and earth," then É-kur = É-shar-ra = É-char-sag-gal-kur-kur-ra must be = "heaven and earth" too![4]

When making the equation Anshar (Ashshur) = Enlil, we would seem to be in straight contradiction not only to Damascius, but also to the Babylonian Creation Epic.

Damascius[5] informs us that Tauthe (= Tiâmat), the mother of the gods, and Apason (= Apsû) begot 1. Moümis (= Mummu); 2. Lache (= Lachamu) and Lachos (= Lachmu); and 3. Kissare (= Kishar) and Assoros (= *Anshar*). By the latter two were born Anos (= Anu), Illinos (= Enlil), and Aos (= Ea). Damascius's authority for this statement is generally supposed to be the first tablet of the Babylonian Creation Epic, from which we learn, that Tiâmat and Apsû, "when their waters in one joined themselves together," brought forth Lach-mu and La-cha-mu, and later on

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[1] Thus the *ab-ba dingir dingir-ru-ne* in E. B. H. p. 97, and C. S. p. 19, 9, ought to be translated.

[2] For these attributes in connection with Enlil see my *Creation Story*, p. 19 f.

[3] Just as Enlil became a title, viz., *bêl* = lord, so Ninlil became at this time = *bêlit* = mistress —an attribute borne chiefly by Ishtar, who therefore appears in most cases as the wife of Ashshur.

[4] This against Jensen, *Kosm.*, p. 194; K. B. VI[1]. pp. 50, 41; 369, who thinks that E-kur, etc., be = earth!

[5] Zimmern, K. A. T.[3] p. 490; Carus, *Monist*, XI., p. 405.

also (?) An-shar and Ki-shar. A long time after these latter two there were born also Anu, Enlil, and Nugimmut (= Ea). If we compare these two accounts we find, that Moũmis (= Mummu[1]) is not mentioned at all in the beginning of the Babylonian Creation Epic. Later on he is introduced quite abruptly and seems to have been a "son of Apsû."[2] In the newly-discovered fragments of this very same Epic[3] Mummu appears as a messenger (!)[4] of Apsû, which latter, together with his wife, Tiâmat, and Mummu enters into a conspiracy against the newly-created gods, who had by their "action" disturbed him. Ea hears of this conspiracy and puts—it would seem—an end to Apsû and Mummu.[5]

But how could Damascius possibly put Mummu before Lachmu and Lachamu, seeing that the first tablet of the Creation Epic cannot have been in this respect his authority?

In order to explain this we shall have to consider somewhat more fully Damascius's statement as well as that of the first tablet of the Babylonian Creation Epic.

We begin with:

A. MUMMU.

The Babylonian Mummu was correctly recognised to be the prototype of the Greek Μωυμις (Moũmis)—an attribute not only of Tiâmat,[6] but also of god Ea.[7] The god Ea is the Sumerian En-KI,

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[1] Mummu appears there only as an attribute of Tiâmat, K. B. VI[1]. p. 2, 4.

[2] K. B. VI[1]. p. 4, 17. According to Damascius, however, he is undoubtedly a son of Apsû and Tiâmat: ἐξ ὧν μονογενῆ (!) παῖδα γεννηθῆναι τὸν Μωῦμιν. K. A. T.[2] p. 490. Notice the μονογενῆ (!) = only begotten!

[3] King, *The Seven Tablets of Creation*, Vols. I. and II.

[4] I. e., the son! Cf. Nin-Girsu and Enlil, Nusku or Nergal and Sin, etc.

[5] According to these new facts, brought out by Mr. King's book, we would have to distinguish two "*fights*" in the Creation Epic: (1) That of Ea against Apsû and Mummu. (2) That of Marduk against Tiâmat. The result of both these "fights" is the same: Apsû and Mummu as well as Tiâmat are done away with, are conquered and killed. And because Apsû and Mummu were killed by Ea before Marduk entered the field of battle, we may see in this the reason why Qingu, who takes the place of Apsû, plays such a significant rôle in the Epic, and why Mummu is not mentioned at all in the first tablet.

[6] K. B. VI[1]. p. 2, 4; Carus, *loc. cit.*, p. 409: *mu-um-mu ti-amat mu-al-li-da-at gi-im-ri-shu-un.*

[7] Merodach-Baladan-stone (*Beiträge zur Assyriologie*, II. p. 261), col. III. 5:

i. e., "Mr."[1] KI, and as such the "god of the terrestrial ocean." On another place[2] I have shown that "Mr." KI was a brother of AN, "the heavenly ocean." Mr. KI's mother is said to have been *dingir GUR* = the primeval ocean or Tiâmat; hence, if *dingir GUR* be the mother of Mr. KI, she also must have been the mother of Mr. AN. At the time when I wrote my *Creation-Story*, I was not aware of the fact that there was to be found in the cuneiform literature an excellent corroboration of this statement. While studying Jensen's *Kosmologie* I found that he already had mentioned two passages[3] in which *dingir Gur* is called the *dingir âm-ù-tu-AN-KI*, which name can be translated, however, only by "the mother that brings forth AN and KI," and not, as Jensen does, "the mother that brings forth heaven and earth," for if *dingir GUR* be the mother of Mr. KI, and if Mr. KI be "the terrestrial ocean," it follows, that KI in the name *dingir âm-ù-tu-AN-KI* cannot mean "earth." And if KI means "the terrestrial ocean," then AN must mean "the heavenly ocean," who is a brother (achu) and as such opposed to (an achû) the terrestrial one. This name also proves that according to the Sumerian conception, upon which Genesis i. is based, the world was not *created* but *generated*, that we have to see indeed in Genesis i. a תולדות (Toledoth), a "*generation*" of heaven and earth, a *cosmogony*, which *cosmogony* in Sumerian is at the same time a *theogony*!

Mr. KI or Ea, the god of the terrestrial ocean, was considered to be the father not only of the "produce of the sea," but also of the "produce of the earth,"[4]—he, therefore, is called the *mummu* or *ocean*,[5] that builds, creates, produces (*ba-an*) everything (*ka-la*).[6]

(*dù E-a....*) *mu-um-mu ba-an ka-la*. Marduk, the son of Ea, is called (Craig, *Rel. Texts*, I. p. 31, 23) = *mâr mu-um-me*, i. e., the son of *mumme*.

[1] "Mr." = *en* is used here in opposition to "Mrs." = *nin*, i. e., *en* is the husband and *nin* is the wife. The translation "lord" for *en* and "mistress" for *nin* does not give in this particular case the correct and *intended* meaning. In other words: en = lord is the *sensus litteræ*, while en = Mr. is the *sensus litteralis*.

[2] *Creation-Story*, p. 33 ff.; *Monist*, XII. p. 600.

[3] II. R. 54, No. 3, 18; III. R. No. 1, 25–26.

[4] *Creation-Story*, p. 37; *Monist*, XII. p. 604.

[5] Sic! Against, Jensen, K. B. VI[1]. p. 303: "Form." See also Delitzsch, *Handwörterbuch*, p. 415*b*. Marduk, the *mâr mu-um-me* is therefore the same as Marduk *mâr apsî*.

[6] See above, p. 75, note 7.

Damascius, when explaining the name Moūmis, calls him a *νοητὸς κόσμος*, which is generally translated by "intelligible world."[1] The word for "cosmos" in Sumerian is AN-KI. Hence Moūmis = Mummu = ocean must have consisted of an AN and a KI., i. e., of something that is "above" and "below." Moūmis, then, was the ocean that was "above and below"—but this he was not as yet in *fact*, in *reality*, but only *in mind* (*νοητὸς*!). Hence Mummu = Moūmis must have been the "heavenly and the terrestrial ocean" before the *actual* separation or better *differentiation* took place, i. e., before he was considered by the Babylonians as consisting of two brothers (*achu*), who at the same time were opposed to each other (*achû*).[2] Furthermore, Damascius calls Moūmis the "*μονογεμῆ*(!) *παῖδα*," the *only begotten* son of Apason and Tauthe! If, therefore, Moūmis be a *νοητὸς κόσμος*, an ocean consisting "in mind" of an AN and a KI, of an "upper and lower" part, and if *dingir GUR* be "the mother that brought forth the upper (*an*) and the lower (*ki*) ocean," and if the upper part became god AN and the lower part god KI, then Moūmis must be the common name for god AN and god KI before they had been differentiated. This god An and this god KI were—before their differentiation—"the *only begotten*" of Apsû and Tiâmat, hence if Damascius says,[3] that out of Tauthe and Apason be born also "another" generation, viz., Lache and Lachos, he *contradicts himself!* This contradictory statement of Damascius, has led, it is strange to notice, nearly all translators, even Professor Jensen, to translate lines 9–10 of the first tablet of the Epic as follows: (When Apsû and Tiâmat their waters in one had joined together) 9 "da wurden die Götter gebildet [— — —], 10, da entstanden [*zuerst*] Lachmu und Lachamu."[4] Having recognised the contradiction in Damascius's statement, we have to separate line 10 from line 9 by a "period" and begin a new sentence! Translate: "When....then the gods were created. Lachmu and Lach-

[1] Zimmern, K. A. T[3]. p. 490; Carus, *Monist*, XI. p. 406 f.

[2] See *Creation-Story*, pp. 34, 64; *Monist*, XII. p. 601.

[3] K. A. T[3]. p. 490: *ἐκ δὲ τῶν αὐτῶν* (i. e., Tauthe and Apason) *ἄλλην γενεὰν προελθεῖν, Λαχην καὶ Λαχον.*

[4] Jensen, K. B. VI[1]. pp. 2, 9, 10.

amu came into existence, etc." By this translation we are left in doubt with regard to the parents of Lachmu and Lachamu, who otherwise are mentioned quite frequently in the Babylonian Creation Epic. What else we learn about Lachmu and Lachamu may be classified under the following heads:

B. LACHMU AND LACHAMU.

1. They are the *parents of An-shar*, who therefore is the son of Lachmu and Lachamu.[1]

2. They are the *parents of Marduk*. Marduk becomes thus, together with Anshar, a son of Lachmu and Lachamu.[2]

3. *Tiâmat* appears as the *enemy* of Lachmu and Lachamu.[3]

4. Lachmu and Lachamu are *creators*, and those whom they had created are to be found at the side of Tiâmat.[4]

5. *ilu*La-cha-mi is one of the eleven helpers of and created by Tiâmat.[5]

Summing up these facts we would have to distinguish—it seems—between at least the following Lachmus and Lachamus:

a. the parents of Anshar and Marduk, Nos. 1, 2.

b. the enemies of Tiâmat and creators, Nos. 3, 4.

c. and Lachami as one of the eleven helpers of Tiâmat.

This confusion is increased, if we take into consideration two lists of gods,[6] where *ilu Lach-ma* and *ilu La-cha-ma* form one pair

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[1] K. B. VI[1]. p. 12, l. 11 ff.: 11. "Go, Gaga, present thyself to them," 12. "The command which I gave thee, make known unto them": 13. "An-shar, your (i. e., L. and L.'s) son hath sent me." Conf. *loc. cit.*, p. 16, 67; Carus, *Monist*, *loc. cit.*, p. 414, where it is recorded that Gaga did go to L. and L., and, when he appeared before them, said unto them: "An-shar *ma-ru-ku-nu u-ma-'i-ir-an-ni*," i. e., "Anshar, your son hath sent me." See, however, below sub C. 1.

[2] K. B. VI[1]. p. 14, 55; Carus, *loc. cit.*, p. 414. Anshar dispatches his messenger Gaga to inform L. and L. that Anu and Nugimmut had been sent out already by him (i. e., Anshar) against Tiâmat—but with no result. "Whereupon I (i. e., Anshar) commanded Marduk, the wise one among the gods, *your son* (to go against Tiâmat)."

[3] K. B. VI[1]. pp. 16, 65; 20, 124, 125; cf. p. 12, 4, and see below, C. 3.

[4] K. B. VI[1]. p. 4, 4 below; cf. pp. 12, 17–18; 17, 76.

[5] K. B. VI[1]. pp. 6, 17 (=Carus, *loc. cit.*, p. 411); 18, 89.

[6] II. R. 54, No. 3, 9, and III. R. 69, No. 1, obv. *l. l.* 14, 15.

among the "twenty-one who have An-na for their parent"[1] and where they are identified with *ilu A-nu-um* and *An-tum*. In a third list[2] appears *ilu Lach-ma* even as the "*ilu A-nu* of the totality of heaven and earth."[3]

The same confusion is met with

C. ANSHAR AND KISHAR.

1. The first tablet of the Babylonian Creation Epic mentions Anshar and Kishar after Lachmu and Lachamu, as children of whom? of Tiâmat and Apsû? or of Lachmu and Lachamu?[4] Later on, however, appears Anshar as the *son of Lachmu and Lachamu*.[5]

2. Anshar is the *father of ilu A-ni(u)m*.[6]

3. Anshar[7] sends out Anu and Nugimmut against Tiâmat after he had been informed of her rebellion by Ea.[8] Anshar appears here evidently as the *chief opponent, chief enemy of Tiâmat*.[9]

4. Marduk, after having overcome Tiâmat, put into prison her helpers, taken the tablets of fate from Qingu, had, by doing all this, "completely established Anshar's supremacy over the enemy."[10]

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[1] See below.

[2] II. R. 54, No. 4, 7.

[3] *sha kish-shat AN-KI*, see below! For still other occurrences of *ilu Lachmu* see, besides the places quoted by Jensen, *Kosm.*, p. 275, also Craig, R. T. I. p. 8, Rev. 1: *ilu Lach*(= Tsab!)*-mu*, Craig, *loc. cit.*, p. 30, 37: *ilu Lach-me*; Zimmern, Shurpu, VIII. 19: *ilu La-ach-mu*.

[4] See K. B. VI[1]. p. 2, 12; Carus, *loc. cit.*, p. 410. According to this passage, then, we are left in doubt as to the parents of Anshar and Kishar! According to Damascius, however, (see K. A. T[2]. p. 490: εἶτα αὖ τρίτην ἐκ τῶν αὐτῶν i. e., Tauthe and Apason, Κισσαρη καὶ Ἀσσωρον), were Anshar and Kishar, the sons of Tiâmat and Apsû. If this be true, then Damascius would contradict himself here again, for he expressly told us that Mummu = Moũmis was the "only begotten" son of Tauthe and Apason!

[5] K. B. VI[1]. pp. 12, 13; (= Carus, *loc. cit.*, p. 413); 16, 68 (= Carus, *loc. cit.*, p. 414). See already above, sub B. 1. Also these passages show quite clearly that Damascius's statement cannot be true.

[6] K. B. VI[1]. p. 10, 1, 8, 10, 12.

[7] K. B. VI[1]. p. 14, 53, 54.

[8] King, Tablet II.

[9] Cf. above, B. 3, where Lachmu and Lachamu are opposed to Tiâmat.

[10] K. B. VI[1]. p. 28, 125; Carus, *loc. cit.*, 418.

Marduk apparently is here the *champion of Anshar*, the enemy of Tiâmat.[1]

5. Anshar and Kishar are likewise to be found among the "twenty-one who have An-na for their parent," and as such again either = ^{ilu}*A-nu-um* and *An-tum*, or = ^{ilu}*An-num* "of the totality of heaven and earth."[2]

6. An-shar is the builder of *É-shar-ra*;[3] according to the fourth tablet of the Babylonian Creation Epic it is Marduk who builds it.[4]

7. An-shar is, as we have seen above, the common ideographic writing of the chief-god of the Assyrians: Ashshur.

This confusion throws a striking light upon the literary character of the Babylonian Creation Epic. Taking the above-given peculiarities into account, we would have to distinguish at least the following different sources—each source being represented by its own specific god, who at one time or another was the opponent of Tiâmat:

1. Lachmu (and Lachamu): B. 3.

2. Anshar: C. 3, 4.

3. Marduk: the whole of the Creation Epic as we have it now.

4. Ashshur, whose name is only the Assyrian equivalent of the Sumerian Anshar.

From this it would also follow, that these four gods were the same—at least in "essence," if not in name:

I. Anshar is = Lachmu[5] (and Lachamu), because both appear

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[1] See No. 3 and cf. B., No. 3.

[2] II. R. 54, No. 3, 6; III. R. 69, No. 1, obv. 8, 9; II. R. 54, No. 4, 4.

[3] K. 3445 + Rm. 396, published in *Cuneiform Texts*, XIII. 24 f. See also Delitzsch, *Weltschöpfungsepos*, No. 20, p. 51 ff.

[4] "After the lord (i. e., Marduk) had measured the form (?) of the ocean
He erected "a great house" (*esh-gal-la*) like unto it; (i. e., like unto the ocean), viz., É-shar-ra,
'The great house,' viz., *É-shar-ra*, which he had built as a (or: to be a) *sha-ma-mu*
He caused ^{ilu}*A-num*, ^{ilu}*En-lil*, and ^{ilu}*Éa* to inhabit as their city."
K. B. VI[1]. p. 30, 144–146 (Carus, *loc. cit.*, p. 419).

[5] Just as Nin-Girsu, the son of Enlil, was identified with his father, cf. among other arguments also the name: É-ninnû-^{dingir} Im-gig-ghu-bar-bar (ninnu = Enlil!), and as the "angel of the Lord" with the "Lord," so was Anshar, the son of L. and L. (B. i.), with Lachmu.

a. as the enemy of Tiâmat: C. 3, 4; B. 3;

b. among the "twenty-one who have Anna for their parent";

c. are identified (α) either with ^{ilu}*A-nu-um* (and *An-tum*), (β) or with ^{ilu}*A-num* "of the totality of heaven and earth."

II. Anshar = Marduk:

a. both are the sons of Lachmu (and Lachamu): B. 1; B. 2.; C. 1.

b. both are the builders of *É-shar-ra*: C. 6.

c. both are the enemies of Tiâmat; Anshar: C. 3. 4; Marduk: the whole Creation Epic in its present literary form.

III. Anshar = Ashshur: C. 7.

The rôle of Ashshur as creator was derived from Anshar, or better: "Ashshur the creator" can also be read "Anshar the creator." Marduk the creator derived his power from Enlil, whom he displaced and whose name and attributes he received. Above we have seen, that even Anshar = Ashshur was completely identified with, and even called, Enlil. If therefore Anshar be = Enlil, and if Anshar be also = Lachmu, then Lachmu must be = Enlil too!

Enlil is the "king" of "heaven and earth," Anshar as well as Lachmu are = ^{ilu}*A-num* "of (the totality of) heaven and earth"—hence if our identification, Enlil = Anshar = Lachmu, be correct, then Enlil the "king of heaven and earth" *must* be = ^{ilu}*Anum* "of (the totality of) heaven and earth," i. e., Enlil = Anum!

This result sheds a new and unexpected light upon the hitherto completely misunderstood[1] three lists of gods, mentioned above.

For the sake of completeness and on account of their importance I may be permitted to give them here in transcription.

List I.: II. R. 54, No. 3.

This list arranges the "twenty-one who have Anna for their parent," in *pairs*. These pairs are husband and wife. The first three lines, which are separated from the rest, must contain only one out of the twenty-one names. This *one* name is explained according to its different meanings, which it may have when brought into relation to the following ten pairs. It reads:

[1] Jensen, *Kosm.*, pp. 192 f., 272 f.; Zimmern, K. A. T^{3}, p. 506.

I. 1.[1]	*AN*	*^{ilu}A(!)-nu(!)-[um]*
2. *AN*, i. e.,[3] *An-tum*[4] =[5]		*irtsitim*[6] *[^{tim}]*
3. *AN-KI*[7]		*^{ilu}A-nu ù [An-tum]*
II. 4. *^{dingir}*	*IB*[8]	*^{dingir}Nin-[IB*[8]*]*
III. 5. *An-shar-gal*[9]		*^{dingir}Ki-shar-[gal]*[10]
IV. 6. *An-shar*[11]		*^{dingir}Ki-[shar]*[12]

[1] The Roman numbers indicate the "*pairs*." The Arabic numbers give the lines of the inscription.

[2] Copy gives for A-nu = ZI, but wrongly.

[3] Sign GUR: S^{c} 239 = Brünnow, *List*, No. 7315.

[4] The sign for god is wanting in order to avoid a possible misreading: *ilâni* (= gods of) *Tum*. See also note to Anshargal!

[5] The common "sign of separation," Brünnow, *List*, No. 7757.

[6] Written KI[ ]. Notice here that AN = KI!

[7] If *KI* = *irtsitu* = *Antum* = *AN*, and if *^{ilu}A-nu-um* be also = *AN*, then we have to see in this *AN* = the first *pair!*

[8] According to II. R. 54, No. 4 (see below!) *IB* has the gloss: *ú-ra-ash*, and according to II. R. 57, obv. C. l. 31, that of *ú-ra-âsh*, as such he is identical with *^{ilu}NIN-IB sha ud-da-zal-li*. This latter passage shows that we should read in each and every instance the god *^{dingir}IB* resp. *^{dingir}NIN-IB* = *^{dingir}Urash* resp. *^{dingir}Nin-urash*. Zimmern, *Babylonische Busspsalmen*, p. 50, thinks that *urash* be a Semitism, it being derived from *erêshu* = "entscheiden." Not from *erêshu* = "entscheiden," however, but from *erêshu* = "to irrigate" (!), Delitzsch, H. W. B. p. 140*b*, has *urash* "to be derived." This holds true not only of the *^{ilu}Ir-resh* = *êrish* in IV. R. 34, 51*b*, and the *^{ilu}Ir-ri-esh* UR-SAG in Reisner, *Hymnen*, pp. 86, 8; 134, 25, 26, but also of the "*Eresh*" in the name of the goddess *Eresh-ki-gal*, against Jensen, K. B. VI^{1}. p. 388, who takes *eresh* here in the sense of "gewaltig." Hence *^{dingir}Nin-IB* (= *urash*) is also called *^{dingir}Engar* (= *erêshu*) = "the irrigator," as such he is the god of the "farmers" = *ikkaru* = *engar!* Cf. also *Ur-^{dingir}Nin-Girsu* = *ikkaru* = farmer (C. S. p. 66, note). This also proves that *^{dingir}Nin-Girsu* is = *^{dingir}Engar* = *^{dingir}Nin-IB* (= *urash*) which latter, originally masculine, was identified not only with *^{dingir}IB* but even with *^{dingir}Nin-IB*, the *wife* of *^{dingir}IB!*

[9] *Shar* = *CHI* = *kishshatu* = totality. The sign for "god" = *an* is wanting before this name, because, if it had been written, one might read "*dingir-dingir shar-gal*" and translate "the gods of the great totality." In order to avoid such a possible reading and translation, the sign for "god" was omitted. Cf. also Antum and An-shar. The name signifies: "the great upper totality."

[10] "The great lower totality"—as such opposed to the upper one!

[11] For this writing instead of *^{dingir}An-shar*, see sub An-shar-gal. The name means = "the upper totality."

[12] The lower totality."

V.	7.	*dingir En-shar*[1]	*dingir Nin-[shar]*.[2]
VI.	8.	*dingir Du-uru*	*dingir Da-[uru]*[3]
VII.	9.	*dingir Lach-ma*[4]	*dingir La-cha-m[a]*[5]
VIII.	10.	*dingir É-kur*[6]	*dingir Gâ-r[a]*[7]
IX.	11.	*dingir A-la-la*	*dingir Be-li-l [i]*[8]
X.	12.	*dingir* ditto(=*A-la-la*)-*alan*	*dingir* ditto(=*Be-li-li*)-*alan*
XI.	13.	*dingir En-uru-ul-la*	*dingir Nin-uru-ul-la*[9]
	14.	*21 en ám-*	*a-a An-na-ge*(!)[10]

[1] Either Mr. Shar (=totality) or "lord of the totality."

[2] Mrs. Shar, or mistress of the totality. These two names as well as those in l. 13 show, that these *pairs* are husband and wife!

[3] Both these names have to be translated by "Eternal (one)" =Hebr. דוד, and are as such Semitic names. Cf. also l. 13.

[4] Sign *lach*=*LUCH*, so generally. For other writings, see besides note 3 above p. 79, also *dingir Lach-mu*, K B. VI[1]. pp. 2, 10 [12, 4]; 16, 68; *dingir Lach-cha*, K. B. VI[1]. p. 20, 125, and Λαχος.

[5] Also written *dingir La-cha-mu*, K. B. VI[1]. pp. 2, 10; [12, 4]; 20, 125. *dingir La-cha-me*, *loc. cit.*, p. 16, 68, (In *loc. cit.*, p. 18, 89 appears this name among the eleven helpers of Tiâmat); Λαχη. What these names mean, is not yet apparent, but cf. at the present the note of Houtsma, *Zeitschrift für alttestamentliche Wissenschaft*, 1902, p. 329 ff., on לַחַם, לַחוּם, and מִלְחָמָה.

[6] "The god of E-kur." *É-kur* is the temple of *dingir En-lil* in Nippur. Hence *dingir É-kur*=*dingir En-lil*!

[7] *dingir Gâ-ra* for *Gar-ra*=*Gâl-la*=Assyrian *Mualliditu*="the one who brings forth." For *gá*=*gal* see Jensen, Z. A. I. 192; Strassmaier, *Syll.* 154. This pair is left out in the list III. R. 69, No. 1, obv., where instead of it the pair *AN*+*KI* is added.

[8] For this reading see Jensen, *Kosm.*, 272, 2. She appears as the sister of Tammuz, who is "her only brother" (*a-chi e-du*) as well as "the paramour (Buhle) of her youth" (*cha-mer tsi-ich-ru-[ti-sha]*): K. B. VI[1]. p. 90, 51, 55, 47. Jensen, *loc. cit.*, p. 404, thinks it not impossible that *Belili* be=*Bulala*, the queen of *PA-AN*, mentioned in II. R. 60, 27*a* and 26*b*. *PA-AN* he takes to be a name for "the nether world." An identification of *Belili* with the Elamitic divinity *Belala* or *Bilala* he does not venture to maintain.

[9] "Lord resp. Mistress of the eternal city." Cf. l. 8.

[10] III. R. 69, No. 1, obv. 22 has: *21 en ám-a-a An-na-ge-ne*. *Am-a-a* is translated in IV. R. 25 f. by *a-bi um-mi*:

25. *zi dingir En ám-a-a dingir En-lil-lal-ge ghe-pad*
26. *nish be-el a-bi um-mi sha du EN-LIL lu-u ta-ma-a-ta.*
27. *zi dingir Nin ám-a-a dingir Nin-lil-lal-ge ghe-pad*
28. *nish be-el-ti a-bi um-mi sha du* ditto(=*NIN-LIL*) *lu-u ta-ma-a-ta*,

i. e., "by Bel resp. Belit the *ám-a-a* of Enlil resp. Ninlil mayest thou swear." This shows that *ám-a-a* may be applied to a male or a female god. *Am-a-a* lit. translated is="*mother-father*," the Assyrian translates it by "*father-mother*"

Similar to the preceding is

LIST II.: III. R. 69, No. 1, OBV.,

where the names of the single pairs are arranged—with the exception of the second—not side by side, but one below the other. This list reads:

I.	1.	*AN*	^{ilu}*A-nu-um*
	2.	*AN*	*An-tum*
	3.	*AN-KI*[1]	^{ilu}*A-nu-um u* (i. e., and) *An-tum*
III.	4.	^{dingir}*IB* (=*urash*)	ditto (i. e., ^{ilu}*A-nu-um u An-tum*)[2]
	5.	^{dingir}*Nin-IB* (=*urash*)	ditto
IV.	6.	*An-shar-gal*	ditto
	7.	^{dingir}*Ki-shar-gal*	ditto
V.	8.	*An-shar*	ditto
	9.	^{dingir}*Ki-shar*	ditto
IV.	10.	^{dingir}*En-shar*	ditto
	11.	^{dingir}*Nin-shar*	ditto
VII.	12.	^{dingir}*Du-uru*	ditto
	13.	^{dingir}*Da-uru*	ditto
VIII.	14.	^{dingir}*Lach-ma*	ditto
	15.	^{dingir}*La-cha-ma*	ditto
IX.	16.	^{dingir}*A-la-la*	ditto
	17.	^{dingir}*Be-li-li*	ditto

(conf. also II. R. 62, 21*c*: *AM-TU* [which has the gloss *a-ga-ri-in* in V. R. 29, 67*g*] = *a-bu um-mu*). It is a shorter form for *ám tu-ud-da* and *a-a tu-ud-da*: IV. R. 10, Rev. 51, and corresponds to our word "*parent*." The line in question may therefore be translated: "twenty-one of (*ge*) the lord (*en*), the parent (*ám-a-a*) *An-na* they are (*ne*)," i. e., twenty-one who are of the lord, the parent Anna or who have Anna for their parent. If this translation be accepted, then AN-NA-ge would be a genetivus *objectivus*. It *may* be, however, also a genetivus *subjectivus*. In this latter case the twenty-one would be = the "parent AN-NA"—thus leaving us in doubt with regard to the "parentship" of these twenty-one gods. If the AN-NA-ge be construed as a gent. subj., the translation would be: twenty-one (sc. names) of (=for) the lord, the parent AN-NA (they are). But whatever translation we accept—the result remains the same!

[1] This pair is not found in the above-given list, for there *an-ki* is used as a kind of introductory explanation not only to all the following pairs, but also to the pair *AN! An-ki* here takes the place of ^{dingir}*É-kur* and ^{dingir}*Gá-ra* of the preceding list.

[2] We would expect that ^{dingir}*IB* would be = ^{ilu}*A-nu-um only*, but not so here. Cf. for the present here ^{dingir}*En-lil* = king of heaven and earth, and ^{dingir}*Nin-lil* also = queen of heaven and earth, and see below!

X. 18.	*dingir*ditto (=*A-la-la*)[1]-*alan*	ditto
19.	*dingir*ditto (=*Be-li-li*)-*alan*	ditto
XI. 20.	*dingir En-uru-ul-la*	ditto
21.	*dingir Nin-uru-ul-la*	ditto
22.	*21* (!) *en ám-a-a*	*An-na-ge-ne*

List III.: II. R. 54, No. 4,

gives us the names of the "husbands" only. It reads:

1.	[ ] *AN*	*ilu A-nu-um*
2.	[*dingir*] (*u-ra-ash*)[2] *IB*	*ilu*ditto (=*A-nu-um*) *sha ish-shim ik-ri-bi*[3]
3.	[*A*]*n-shar-gal*	*ilu*ditto (=*A-nu-um*) *sha kish-shat AN-KI*[4]
4.	[*A*]*n-shar*	*ilu A-nu* (*chi-bi*)[5] ditto (=*sha kish-shat AN-KI*)
5.	[*din*]*gir En-shar*	*ilu* ditto
6.	*dingir Du-uru*	*ilu* ditto
7.	*dingir Lach-ma*	*ilu* ditto
8.	*dingir É-kur*	*ilu* ditto
9.	*dingir A-la-la*	*ilu* [ditto
10.	*dingir*ditto (=*A-la-la*)-*alan*	*ilu* [ditto
11.	*dingir En-uru-ul-la*	*ilu* [ditto

Looking over these three lists we will have to admit that the "*husbands*" as well as the "*wives*" are the same "*among themselves*," for they are identified either with *Anum* resp. *Antum* or with *Anum* "*of the totality of heaven and earth.*" If we succeed in identifying one husband resp. wife correctly—we *ipso facto* did it with all.

A good starting-point is, no doubt, *dingir É-kur*, i. e., "the god

[1] This writing shows that we have here also an arrangement according to *pairs* —or else the "ditto" in lines 18 and 19 would have to be referred to line 17—an hypothesis which is forbidden by the first list! Cf. List I., lines 11 and 12.

[2] *u-ra-ash* is the gloss to *IB*, giving its pronunciation. See above, note to *dingir IB*.

[3] I. e., "Anu who hears prayers." See also Jensen, *Kosm.*, p. 194 and note 1.

[4] I. e., Anu of the totality of heaven and earth.

[5] *chi-bi* = "is broken, damaged"—shows that the original from which this copy has been made, was unreadable here—the sign "*um*" probably having been broken away.

of É-kur." É-kur is the temple of Enlil—hence "the god of É-kur" can be only Enlil. And if *dingir É-kur* be = *dingir Enlil*, then his wife *dingir Gá-ra* must be *dingir Ninlil*. We are justified in saying:

The "*twenty-one who have Anna for their parent*" are nothing more nor less than *twenty-one different names* (!) *of god LIL "the king of heaven and earth,"*[1] the son of AN or "heavenly ocean"—of god LIL considered either

a. as a whole = *AN*[2] = *LIL* = רקיע (firmament) = "heaven and earth" = *an* + *an* or *an* + *ki* = *Anum* + *Antum*.

b. or as consisting of a male or female, i. e., of *husband* and *wife*: *En*-lil + *Nin*-lil = *En*-shar + *Nin*-shar = *En*-shar-gal + *Nin*-shar-gal = *En*-uru-ul-la + *Nin*-uru-ul-la = *Anum* + *Antum*.[3]

c. or as "brother and sister" (i. e., *achu* + *achatu*): En-*lil* + Nin-*lil* = En-*shar* + Nin-*shar* = En-*shar-gal* + Nin-*shar-gal* = En-*uru-ul-la* + Nin-*uru-ul-la*.[4]

d. or as "opposed to each other" (i. e., as *achû* and *achîtu*):[5] *AN* + *KI* = *An*-shar + *Ki*-shar = *An*-shar-gal + *Ki*-shar-gal.

Although we have only *twenty-one* (!) names, yet we are supposed to have, according to the arrangement of the lists, eleven (!) pairs. This difficulty would require a few words of explanation.

AN is the first *name*, but also the first *pair*, for *AN* is not only explained by Anum and Antum,[6] but also by *an* = *Anum* and *an* = *Antum* = *KI*, i. e., = *irtsitim* or earth.[7] If *Antum*, the *wife*, be the "*earth*," then *Anum*, the *husband*, must be the *heaven*. Hence the

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[1] C. S. p. 19, 4; *Monist*, XIII. p. 586.

[2] See below!

[3] From this it follows that *lil* = *shar* = *shar-gal* = *uru-ul-la* = (Anum + Antum *sha kish-shat*) *AN-KI*, i. e., "*the totality of heaven and earth*." Hence the *shar* = *kishshatu* = totality in Enlil's and Anshar's temple É-shar is = the totality of heaven *and* earth—and the cosmic É-shar must be = *heaven and earth!*

[4] Does our modern custom of the wife's taking the "name" of her husband go back to this oldest of historic times, when the wife was the *sister*—thus also of *one flesh*—of her husband? Has anyone made this point the subject of a special investigation?

[5] C. S. p. 34 = *Monist*, XII. p. 601.

[6] See second list!

[7] See first list.

name AN reveals to us the remarkable fact that it is a *pair*, consisting out of *husband* and *wife:*

Anum + Antum, that the husband and wife are also brother and sister:

an + an, and that the husband is opposed to the wife:

an + ki = heaven + earth—the husband being "above" and the wife being "below."

Thus we find here a welcome corroboration of our statement[1] that "*heaven and earth*" were considered to be *one.* This one cosmic quantity was called not only LIL, but also AN. AN when translated into Semitic-Babylonian becomes = *shamê. Shamê*, therefore, *must* stand for "*heaven and earth*" too! "Heaven and earth" are the Sumerian as well as Semitic-Babylonian and Hebrew *terminus technicus* for "*cosmos*"—hence *shamê* must be = *cosmos!* Now we understand Hesychius's remarkable statement quoted, but misunderstood, by Jensen in his *Kosm.*, p. 3: Σανη (read Σανη) ὁ κόσμος Βαβυλώνιος, i. e., "shamê is the Babylonian cosmos," and Hesychius's gloss to Βῆλος (= Marduk): οὐρανὸς καὶ Ζεὺς καὶ Ποσειδῶνος υἱός, i. e., Bel or Marduk (originally = Enlil!) is not only the οὐρανός (= shamê = AN = an + ki = heaven + earth), but also (our) Zeus, and a son of (our) Poseidon, the terrestrial ocean = EN-KI or Ea (originally AN, the heavenly ocean!).[2] The Sumerian AN, thus, is indeed a word for *cosmos* and stands as such for the first "pair," i. e., either for an + an, or for an + ki = Anum + Antum, the personifications of "heaven and earth."[3]

In Craig, *Religious Texts*,[4] we learn of "a house in Nippur" called *Dur-an-ki*[5]—a name which is translated by "band of heaven

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[1] C. S. p. 52; *Monist*, XII. p. 619.

[2] All this against Jensen, *Kosm.*, p. 391.

[3] Against Jensen, *Kosm.*, p. 3.

[4] Vol. I. p. 19, l. 9: *esh En-lil-ki Dur-an-ki.*

[5] Hilprecht, *Excavations*, p. 462, mentions this *Dur-an-ki* in such a way, as if *he* only knew anything about the existence of this "house," saying: "A fourth name (viz., of the zigurrat of Nippur), *to state this distinctly here*, occurs in another *unpublished* text....belonging to the results of *our latest* excavations at Nuffar." The passage cited from Craig will show Hilprecht that the name *Dur-an-ki* of the zigurrat of Nippur was known *eight years* before *he* discovered (!) it!

and earth."[1] According to *Zeitschrift für Assyriologie*, Vol. X., p. 294, l. 1, it is the *É-char-sag-kur-kur-ra*, which is called "the band of heaven and earth"—hence *É-char-sag-kur-kur-ra* = *Dur-an-ki*. Above[2] we have seen that *É-char-sag*(*-gal*)*-kur-kur-ra* is not only = *É-shar-ra* but also = *É-kur* "the mountain house," hence also this latter must be = "band of heaven and earth." But the god of *É-kur*, the *dingir É-kur*, is one of the "twenty-one who have Anna for their parent," hence the "god of É-kur" must also be the "god of the band of heaven and earth." The god of Ékur being Enlil, Enlil becomes thus the "god of the band of heaven and earth."

Furthermore, just as the "band of the sill" is = sill,[3] and as the "firmament of heaven" is = heaven,[4] so is the "band of heaven and earth" = "heaven and earth"[5]—hence *DUR* = רקיע, and *dur-an-ki* = firmament of heaven and earth = heaven and earth. The god of Dur-an-ki, Enlil, is therefore again the god of "heaven and earth" or of the "firmament of heaven and earth"!

Above we saw that *AN* is = heaven and earth = cosmos, hence the *dingir Dur-an*,[6] who is said to be = *ilu BE* (= Bêl = Enlil!), is not only a corroboration that our conclusions be correct, but this name also shows, that *dingir Dur-an* is not an abbreviation of *dingir Dur-an-ki*,[7] but a *correct* and *justified* writing. *dingir Dur-an* means the "god of the band of the *shamê*" = Σανη, which is the "*Babylonian cosmos*," i. e., heaven and earth = an + ki!

These considerations put us into a position to explain also the following peculiarities:

a. The god *IM*, whom we identified with *Nin-Girsu* or *Im-gigghu-bar-bar* is called "*the son of Anna*,"[8] instead of—as in case of Nin-Girsu—the son of Enlil. Anna being here only

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[1] *Rikis shamê u itsirtim*, from *rakâsu* to bind.

[2] P. 74.

[3] K. 8665, Meissner, *Suppl.*, p. 14, hinten: *rikis sippi* = *sippi*.

[4] רקיע השמים = שמים, Gen. i. 8.

[5] *Dur-an-ki* = *an-ki*.

[6] II. R. 54, 4*a*.

[7] As Hilprecht, *Excavations*, p. 463, 2, thinks.

[8] Reisner, *Hymnen*, p. 120, 10, 15.

another name for Enlil, the "king of heaven and earth," must stand here likewise for "cosmos."[1]

b. Very often we read of the "*hosts of A-nim*"[2] as well as of the "*warriors of A-num, i. e., (sic!) Da-gan.*"[3]

That Anum be here = Enlil is apparent from the following reasons:

a. The *tsa-ab* resp. *qi-its-ri Anim* was rightly recognised[4] to correspond to the Hebrew יהוה צבאות—hence Anim = Jahveh!

β. According to Gen. ii. 1, the "hosts" belong to "the heaven and the earth"[5]—hence the "hosts of Jahveh" are those of "heaven and earth," i. e., Jahveh = cosmos.

γ. "Heaven and earth" or the cosmos are in Hebrew as well as in Babylonian the respective domains of Enlil or Jahveh. The former has therefore the title "king of heaven and earth,"[6] and the latter "god of heaven and earth"[7]—hence Jahveh = cosmos = Enlil.

δ. Anum is one of the "twenty-one who have Anna for their parent" and corresponds not only to the Sumerian *an* + *an* or *an* + *ki*, but also to *AN*, i. e., the Σανη, and to the AN in ^{dingir}*Dur-AN*, i. e., he is the personified *cosmos*, as such also called ^{dingir}*É-kur* who is the *Enlil*. Hence *Anim* = *Enlil*. But if Anim be here = Enlil, then the *hosts* can be only the *children* resp. *grandchildren* of Enlil, i. e., *ZU* or the moon, *Nin-Girsu* or the thundering dark cloud, *UD* or the sun, *Innanna* or the morning- resp. evening-star, etc. These children are *gods* and *stars*

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[1] See also the different genealogies of Ninib in my forthcoming article on Jahveh, and also the genealogies of Nusku, the son of Anu = Enlil = lord of heaven and earth = É-kur = Dur-an-ki, who again were identified with Ea = ocean and with Sin.

[2] See e. g. K. B. VI[1]. pp. 122, 4; 134, 31 *et passim*: *qi-its-ri sha* ^{du}*A-nim*.

[3] Sargon, *Bronce-Inscript.*, 14: *tsa-ab* ^{du}*A-num u* (*Var. ù*) ^{du}*Da-gan*.

[4] Jensen, K. B. VI[1]. 431.

[5] לויכלו השמים והארץ וכ צבאם.

[6] lugal an-ki.

[7] יהוה אלהי השמים והארץ.

—even Nin-Girsu = Adad was considered to be a star: VR. 46, 44*ab* = *mul nu-mush-da* = ^{ilu}*Sha-gi-mu* and K. 263: [ ] *nu-mush-da* = *namashshû* = ^{ilu}*Adad. Shâgimu* is a name of Adad and signifies: "the one that roars or thunders." See also Jensen, *Kosm.*, p. 140. Hence the בני אלהים mentioned together with Jahveh in Psalm xxix. 1 ff., can be only = the children of Enlil, as such also *gods* and *stars* and the *powers of nature*—for even according to Hebrew conception the stars belong to the רקיע (Gen. i. 14; C. S. p. 53), which רקיע again is = *Dur-an-ki*, the habitation of ^{dingir}*Dur-an* or Enlil! The יהוה צבאות corresponds, therefore, exactly to the title of Enlil "king of the gods" (*lugal dingir-ri-ne*) or to the *tsa-ab* resp. *qi-its-ri Anim.*

c. Above, p. 72, we heard that Anshar = Ashshur is said to have been the "creator of An-na"[1]—an expression which signifies the same as that on p. 73, above, where Anshar = Ashshur appears as the "builder of the heaven of Anim."[2] Anu is in our three lists a name for "the god of É-kur," i. e., for Enlil. AN or AN-NA, we saw, means = Σανη = Assyr shamê—hence "the builder of AN-NA" can mean only the "builder or creator of the *cosmos*," as such it is parallel to the "builder of the *sa-mi* (i. e., Σανη = cosmos) of ^{ilu}*A-nim* = Enlil. The "heaven(s) of Anu" therefore are not the abode of god AN, the heavenly ocean, but are in each and every case the *cosmos*, "heaven and earth" the abode of Enlil, or more especially, the "firmament of heaven" or "heaven" as opposed to the "firmament of the earth" or "earth," the specific domain of Ninlil. "The great gods that inhabit the shamê of Anim" are therefore the moon, sun, the stars, and the powers of nature (=Adad), etc. Hence we cannot find in this phrase the idea—as Jeremias, *Vorstellungen vom Leben nach dem Tode*, p. 60, wants it—that the "Wohnsitz der Götter in verschiedene abgegrenzte Himmel geteilt ist." See also Jensen, *Kosm.*, p. 11.

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[1] *ba-nu-û shu-ut AN-[N]A.* [2] *pa-ti-iq sa-mi* ^{ilu}*A-nim.*

d. In the sentence "the daughter of Anu (= Ishtar) went to Bel her father," above p. 67, Anu and Bel signify the *same god.* Ishtar is the daughter of Bel because she is the *wife* (as such called *Bau*) of *Nin-Girsu.* But Nin-Girsu being the son of Enlil or Bel, his wife *had* to become *also* a daughter of Bel—because a wife is always the *sister* of her husband.

e. As already said, the "heaven and earth," originally one, were later on differentiated and considered as husband and wife: Enlil + Ninlil = Enshar + Ninshar, etc.,—the wife being not only the sister but also "opposed" to her brother or husband. Thus it happed that there corresponds to the Enshar, the husband, an An-shar, and to the Ninshar, the wife, a *Ki-shar*, in other words: the husband was considered to be "above" = an, and the wife to be "below" = ki. The "heaven" becomes thus the husband of the "earth." This "heaven and earth" had two sons: the "moon (ZU) and the "thundering, lightning, dark cloud" (Nin-Girsu or Im-gig-ghu-bar-bar), who by means of his nature was the "mighty hero or prime minister" of his father. The "moon" had for his son the sun (UD). Exactly the same genealogy we find again in *Orac. Sib.*, III. 110 ff., where *Kronos*, *Titan*, and *Japetos* are called the sons of *Ouranos* (= heaven) and *Gaia* (the earth). Now, there cannot be any doubt that Kronos was *originally* the moon, who had become at the time when this genealogy was imported from the Babylonians, the "sun."[1] This change took place at a time when the people began to reckon according to "sun-years." We would like, therefore, to identify *Kronos* with UD the *sun* (originally the moon), *Titan* with *Nin-Girsu*, "*the mighty hero*," and *Japetos* with the *moon* (originally the sun).[2]

These identifications explain also correctly the hitherto mis-

[1] An analogy of this we find also in the Old Testament, Gen. i. 16, where the sun is likewise put before the moon and called "the greater light." See C. S., p. 65.

[2] This against Zimmern, K. A. T[2]. p. 351, who thinks that they are "genau entsprechend der babylonischen Trias Anu-Bel-Ea als Söhnen des Paares Anshar-Kishar.

understood statement of Berosus,[1] according to which *Kronos* warns Chisouthros (= *Ut-napishtim*), while according to the Babylonian flood-story it is Ea. On account of this peculiarity Jensen[2] identified Kronos with Ea; but wrongly! Ea is = Poseidon. Marduk is in the *theological* system the son of Ea or Poseidon. But Marduk is the AMAR-UD, i. e., the son of UD—according to his *name*—and UD is = Kronos, hence Markuk, the AMAR-UD, may quite correctly be called the "son of Kronos." If Kronos was the father of Marduk, the chief-god of the Babylonians, then Ahuramazda *had to have* likewise Kronos for his father! Hence the gloss to Belos in the Arm. Vers. of Euseb. Chron., *loc. cit.*, p. 19: κρόνον, *quem patrem nuncupant Aramazdi.*[3]

Returning once more to our three lists we will have to distinguish between

a. AN = "heavenly ocean," who is called in two of our lists "the lord, the parent AN-NA," and is as such the *father* of those twenty-one gods—or better of one god under twenty-one different names. In Assyrian this god is called Anum, and is a brother of Ea. Anu and Ea again are sons of the "mother that brought forth AN and KI = "heavenly and terrestrial ocean," i. e., of *dingir GUR*.

b. AN = cosmos. As such it stands either for an = Anum + an = Antum or for an = Anum + ki (i. e., earth) = Antum. *Anum*[4] *resp. Antum is here only another name for Enlil resp.*

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[1] *Liber chron.*, edit. Schoene, p. 19–20. [2] *Kosm.*, p. 391.

[3] This statement is very important. It shows that Ahuramazda was considered to be the same as Marduk—had therefore to have the same father. Ahriman and Ahuramazda is Marduk differentiated into the Marduk of the winter = darkness, and the Marduk of the summer = light. The Marduk of the winter is = Nebo, and the Marduk of the summer = AMAR-UD. Cf. the important passage Isaiah xlv. 7: "I am the lord....I form the light, and create darkness." Here the prophet expressly denies that light and darkness have two different sources. Both have *one* god for their author,—a very correct Babylonian idea.

[4] This name Anum was even applied to the moon-god, Sin! See IV. R. 9, 6*a*, and K. 155, quoted by Jensen, *Kosm.*, p. 191, note 1. This is not strange. We know that in Ur as well as in Harran the god Sin was considered to be the highest god, hence—if he were—he *had* to receive all the attributes, names, etc., of Enlil. Yes, even Nin-Girsu the "mighty hero" of Enlil became Sin's messenger and this under the name of Nusku resp. Nergal, see above, page 69, note 5.

Ninlil, the king resp. queen of "heaven and earth"! This AN is the Σανη or κόσμος Βαβυλώνιος of Hesychius.[1]

c. AN either = *shamû*, i. e., "heaven" or = KI., i. e., "earth." The former, when personified may also be called *Anum* or *Enlil*, and the latter *Antum* or *Ninlil*. That *KI* = *earth* was called *Antum* follows also from different other passages in the cuneiform literature, as, e. g., Reisner, *Hymnen*, p. 133,

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[1] Here belongs beside the *dingir Dur-an*, and the expressions: "the creator of *AN-NA*," "the shamê of Anim," mentioned above, also

a. *dingir Si* = *dingir En-lil:* V. R. 44, 35, because *Si* is = *shamû* = Σανη! See II. R. 50, 25*c*, cf. II. R. 39, 47 f. (Against Jensen, *Kosm.*, p. 24.)

b. *dingir BE* = *dingir En-lil:* I. R. 15, 51; V. R. 4, 111 etc., for *BE* is again = *shamû*: II. R. 7, 26*a*; V. R. 39, 45*e*.

c. *dingir NAB*. The sign NAB is expressed by two *an*'s, one put above the other. NAB has according to Delitzsch, *Assyrische Lesestücke*, No. 90, the meaning *shamû*. This NAB is again (because = an + an = heaven + earth) = Cosmos. The *dingir NAB* is not only identified with *dingir En-lil* in V. R. 44, 46*c*., but he is called—like the "twenty-one who have AN-NA for their parent"—the *dumu sag AN-NA*, i. e., the first-born or principal son of AN-NA (= heavenly ocean): Reisner, *Hymnen*, pp. 140, 194; 135, col. IV. 1; 88, 7. And when this *dingir NAB* is called in II. R. 54, 10*a*, *b*, the "Bel of the *shamû*," he does not, as Jensen, *Kosmologie*, p. 25, cf. K. B. VI[1]. p. 347 wants, stand for "den Punkt am Himmel, wo die verschiedenen Teilungslinien zusammenlaufen," but for the Bel of the Σανη! [NAB is also = Tiâmat: 83-1-18, 1332 obv. II. 22, published in *Proceedings of the Society of Biblical Arch.*, Dec., 1888, plate V. But Tiâmat is = *dingir GUR*, "the mother of AN and KI." *GUR* again is not only = *apsû*, "ocean," but also, if pronounced *zikum*, = *shamû*. Hence NAB signifies Tiâmat as the mother of the *apsû* or ocean considered as a cosmos or *shamû* or *AN* + *KI*, i. e., of the ocean as consisting of an upper and of a lower one!]

d. Possibly even *AN-SHAR*, who might be read also *dingir SHAR*. *SHAR*, when pronounced "*du*," is also = *shamû*; hence *dingir SHAR* (= *du*) might be translated "the god of the Σανη, i. e., cosmos! *É-shar* would accordingly become not so much "the house of the totality (= *kishshatu*)" as "the *world*-house. See also above, p. 80, where it is said of Marduk that he had build *É-shar-ra* as (or: to be) a *sha-ma-mu*, i. e., a Σανη or cosmos! This sha-ma-mu here, because it is the habitation of Anu, Bel (= Enlil), and Ea, *must* include the *two oceans*—the heavenly and the terrestrial—*also*. This peculiarity is even adopted by the Priestcode. P.'s expression for "*cosmos*" is generally = "heaven and earth": Gen. i. 1, ii. 1, Ex. xxxi. 17; but also "heaven and earth and the תהום," i. e., ocean: Ex. xx. 2! The É-shar-ra, the world-house, is thus made = heaven and earth and ocean—a, no doubt, late conception, thus showing a tendency towards henotheism, resp. monotheism.

No. III. (sic!), ll. 10–13,[1] where Antum is expressed in the Sumerian line by KI, the ideograph for *irtsitu* = earth. Again on another place[2] this AN-NA is directly translated by *shamê* or "heaven," and the KI (or KI-a) directly by *irtsitim* or "earth"—thus proving beyond a shadow of doubt that *Anum* = *AN* is = heaven and *Antum* = *KI* is = earth. AN thus means indeed either *heaven* or (!) *earth*..[3]

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[1] *dingir A-nun-na AN-NA a-ri-a-ne*
ilu ditto *sha ri-chu-ut ilu A-nim ri-chu-u*
dingir A-nun-na KI (sic!) *a-ri-a-ne*
ilu ditto *sha ri-chu-ut An-tum ri-chu-u.*

Instead of KI we have the correcter writing KI-*a* in Reisner, *loc. cit.*, pp. 132, 19, 20; 78, 12, 13. Cf. also IV. R. 21, No. 2, rev. 1. For *richûti* see Jensen, K. B. VI[1]. p. 365, 6.

[2] *dingir A-nun-na AN-NA mu-ush V-bi*
ilu A-nun-na-ki sha shamê V shu-shi
dingir A-nun-na KI-a mu-ush X-bi
ilu A-nun-na-ki sha irtsitim[tim] ni-e-ir-shu.

Reisner, *Hymnen*, p. 139, 155–158.

See also Reisner, *loc. cit.*, pp. 92, 24, 25; 135, col. III. 30. With regard to the 300 (=5 soss!) "Anunna of heaven," and with regard to the 600 (1 *nêr*) "Anunna of the earth," see Zimmern, K. A. T[2]. p. 453; Jensen, K. B. VI[1]. p. 587. The passages cited in this and the preceding note are important. (1) We have here the Anunna of *heaven*, i. e., the Igigi and the Anunna of the *earth*, i. e., the Anunnaki, as they are generally called in the Assyrian inscriptions. Both classes are said to be the richût, i. e., lit. "the pouring out" = *seed* or *sons* of Anu and Antum. (2) We have seen (C. S. p. 49) that the *king* of the storm-flood is Enlil, while the storm-flood itself is Nin-Girsu or Imgigghubarbar, the *son* of Enlil. Hence, when we read, that either Bêl, i. e., the old Enlil, be the "lord, the *king* of all Anunnaki" (Tiglat-Pileser I. = K. B. I. p. 14, col. I. 3), or that Anu be "the *king* of the Igigi and the Anunnaki" (Shalmanassar II., Obelisk = K. B[1]. p. 128, l. 2), or that Ashshur (= Anshar) be termed "the *king* of the Igigi" (Adad-nirâri III. = K. B[1]. p. 188, No. 2, ll. 2, 3), we must understand these statements as above, i. e., that these *kings* of the Igigi and the Anunnaki are at the same time their *fathers*, and if so, then Enlil is = Anu = Anshar. See here also above, p. 73, where it is expressly said that Anshar is he "who begot (*shâpik* = *rûchû*!) the Igigi and the Anunnaki"! Where the moon-god Sin was considered to be the highest god, it is, of course, natural to find that these very same Igigi and Anunnaki should be assigned to his court, as is done in the celebrated hymn to Sin: IV. R. 9.

[3] That one and the same ideograph should have two diametrically opposed significations is not by any means uncommon—it is simply a corroboration of Winckler's maxim: "Jedes Ding schlägt schliesslich in sein Gegentheil um, wie es der Kreislauf der Natur vorschreibt und bedingt: Wir haben die unzertrennlichen und doch getrennten Dioskuren, Mond und Sonne = Tag und Nacht = Licht und Finsterniss = Winter und Sommer, die beiden Sonnen- und Naturhälften" (M. V. A. G., 1901, IV., Part I., p. 15, note 1), and I may add the "two halves of the world":

If we would sum up our results so far obtained they would be the following:

Out of the primeval ocean, Apsû and Tiâmat, the Sumerian GUR, is born mummu or Moũmis, *νοητὸς κόσμος*—which was only a "world," i. e., an AN and a KI in *mind*, but not in fact. It became a world in fact, when AN begot LIL, who took his place between AN and KI, thus not only separating the AN from the KI, but forming with them the first *triad*. This LIL, the son of AN, appears in the lists above mentioned under twenty-one different names among which are also to be found Anshar and Lachmu. These names are arranged in pairs of husband and wife—the husband being considered the *upper* and the wife the *lower* part. The upper part is the heaven and the lower part the earth. This gives us the most important fact of our whole investigation, which is: heaven and earth are husband and wife, as such called Anum and Antum who again are only two other names for Enlil and Ninlil—Enlil is the heaven and Ninlil is the earth when considered as husband and wife, but when considered as "one flesh" Enlil resp. Ninlil is the "heaven and earth" or "cosmos," hence may be called "king resp. queen of heaven and earth."[1]

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heaven and earth. Among the different ideographs that may stand either for "heaven" or for "earth," I mention besides AN only the two following:

a. *IM=heaven*, Sc. 288; *=earth, ibidem*. A double IM, Brünnow, List, No. 12241, cf. No. 8502, is translated in II. R. 50, 28*c*; II. R. 48, 26*a-b*, by *shamû*, which latter can mean here only=cosmos=heaven + earth. Hence the *dingir IM* + *IM* in III. R. 67, 45*e*; III. R. 67, 42*e*, cannot signify originally the god Adad (or Rammân) but Enlil or Bêl, the god of "heaven and earth." Cf. here also "the gods who are above (*eli*) the IM and below (shapal) the IM" (Pinches, P. S. B. A., 1882, p. 164, 10–11), i. e., beyond the firmament or "heaven and earth," which in the passage cited, p. 163, l. 10, is called the *Char-sag-kalam-ma*=mountain of the world!

b. *U=shamû* "heaven": V. R. 36, 45*b*; *U*, also read *buru*, *=irtsitu*: V. R. 36, 46*b* and *U* is the ideograph for *dingir En-lil*: V. R. 36, 5*a*. This ideograph therefore signifies Enlil as the god of "heaven and earth"—and just as in later times Enlil became an ideographic writing for *bêl* or lord, so *U* was used as an ideograph for *bêl*. Conf. here also V. R. 37, 4*d. e, f*: buru or A-buru=*shamû ruqûtum* "the *far* away heaven," and l. 5: *buru=shamû shaplûtum* "the low(er) heaven," which latter does not speak so much in favor of the "different" heavens, as it proves that the "lower heaven" be the *earth*!

[1] Therefore Anu is called also "(the one) of the totality of heaven and earth."

It was not without some very definite reason that we had to linger so very long over this preliminary investigation, for here we are in direct opposition to all other Assyriologists, who either take Enlil to be the "god of the earth" or the "god of the air."

Our result is of the highest importance, not only for a right understanding of the Babylonian religion as such, but also for the religion both of the Old and the New Testament. In the latter it is especially the *doctrine of the Resurrection* which from our investigation receives a new and welcome light.

The doctrine of the Resurrection, because so closely connected with the personality of Christ, is the *central doctrine* of the Christian religion. It is the *pillar* upon which the Christian Church is built. With it Christianity stands and falls. Says St. Paul:

> "If Christ be not raised, then is our preaching vain, our faith also is vain" (1 Cor. xv. 14.)

And again, v. 17:

> "If Christ hath not been raised, your faith is vain."

It is, however, here of special interest to notice what *philosophic proofs* St. Paul is able to adduce for the resurrection of Christ. His proofs are:

> "Now if Christ is preached that he hath been raised from the dead, how say some among you that there is no resurrection of the dead? But if there is no resurrection of the dead, neither hath Christ been raised."[1]

The same argument is to be found also in verses 15, 16:

> "We witnessed of God that he raised up Christ: whom he raised not up, if so be that the dead are not raised. For if the dead are not raised, neither hath Christ been raised."

Notice, St. Paul does not say: "because Christ rose, therefore the dead rise," but *vice versa*: "If there be no resurrection of the dead, then Christ did not rise;" he wants us, however, to draw the last conclusion: "there *is* a resurrection of the dead, and if there be, then did Christ rise!" Paul, then, takes it for an indisputable fact that the dead *can* and *do* rise, and because *they* can

[1] 1 Cor. xv. 12, 13.

and do rise therefore *Christ* also *could* and *did* rise. Hence with the resurrection of the dead, the resurrection of Christ is given. The fact of Christ's resurrection is thus based, according to St. Paul's argumentation, upon the fact of the resurrection of the dead as such. If you deny the latter, you *ipso facto* deny the former. Everything depends upon our belief in the resurrection of the dead. If we do not believe in this, we do not and cannot believe in Christ's resurrection! Hence, it is quite natural, that St. Paul, when adducing the arguments in favor of the resurrection of Christ, should bring in also those proofs which establish the truth of the resurrection of the dead! And what are these?

> "But some one will say, how are the dead raised? and with what manner of body do they come? Thou foolish one, that which thou thyself sowest is not quickened, except it die: and that which thou sowest, thou sowest not the body that shall be, but a bare grain, it may chance of wheat, or of some other kind."[1]

The proof in favor of the resurrection of the dead is taken from *nature*! He compares the human bodies to "*grain*, it may chance of wheat, or of some other kind." The grain is put into the earth not to die and remain there, but to die and be quickened again, and thus sprout anew, rise to new life, and bear fruit. But this the grain does only in the *spring*! St. Paul's argument then is this: As in the spring nature or mother earth brings forth new life, quickens the "grain," makes it sprout again, so also the "dead" will be quickened, be raised to new life on that great morning when the eternal spring begins! *Nature* demonstrates the *fact* of the resurrection. This "resurrection," because a fact in nature, was *transferred* to "men" also—because they too are a part of nature! Men, as a part of nature, could not make an exception, could not upset the laws of nature, hence had to rise. But if men, as a part of nature, do rise, then Christ also had to rise,—for he belongs to "man." That is the argument of St. Paul.

Having made this clear, we may now pass to the details in

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[1] 1 Cor. xv. 25.

connection with Christ's resurrection. These are probably enumerated best in the well-known, but most difficult, passage of 1 St. Peter iii. 18 ff., where we read:

> "Christ also suffered for sins once.... being put to death in the flesh, but quickened in the spirit, in which also he went and preached unto the spirits in prison, which aforetime were disobedient....the resurrection of Jesus Christ, who is on the right hand of God, having gone into heaven; angels and authorities and powers being made subject unto him."[1]

According to this passage the specific historic facts connected with the resurrection of Christ occurred in the following sequence:

1. suffering, 2. death, 3. quickening, 4. (*a*) going and (*b*) preaching unto the spirits in prison, 5. resurrection.

As Christ's suffering has nothing to do with our investigation here, we confine ourselves to facts Nos. 2–5.

"Death" according to N. T. *usus loquendi* is the separation of the "life-principle" or "soul" from the "body." The body is put into the grave while the soul continues to live as a "spirit." To such spirits, i. e., souls separated from the body[2] Christ went and preached.

If "*death*" be a *separation* of the soul from the body, then the "*quickening*" must be a *joining* together, a reuniting of the soul and body. Christ had to be dead, according to Scripture, for three days. During these three days, then, body and soul were separated. After these three days—or as the varient gives it: on the third day—he had to rise, hence his "being quickened" and his resurrection had to fall on the same day! Christ is said to have risen on early Easter-morning, hence his quickening or the re-

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[1] *ὅτι καὶ Χριστὸς ἅπαξ περὶ ἁμαρτιῶν ἔπαθε....θανατωθεὶς μὲν σαρκὶ, ζωοποιηθεὶς δὲ τῷ πνεύματι ἐν ᾧ καὶ τοῖς ἐν φυλακῇ πνεύμασι πορευθεὶς ἐκήρυξεν ἀπειθησασί ποτε....δι' ἀναστάσεως Ἰησοῦ Χριστοῦ ὃς ἐστιν ἐν δεξιᾷ τοῦ θεοῦ, πορευθεὶς εἰς οὐρανόν, ὑποταγέντων αὐτῷ ἀγγέλων καὶ ἐξουσιῶν καὶ δυνάμεων.*

[2] Also according to Babylonian conception the death consists in a separation of the *napishtu* or life-principle from the body. This *napishtu* continues to live after death as a so-called *ekimmu* or *utukku*, see also Jensen, K. B. VI[1]. pp. 406, 453.

uniting of soul and body must have taken place on early Easter-morning too! As soon as this "quickening" had become a fact "he went and preached." If, therefore, the question be asked: "When did Christ go and preach?" the correct answer can be only this: "On early Easter-morning, immediately after his being 'quickened in spirit'!" In this (ἐν ᾧ) "being quickened in spirit" he went. Hence Christ's going and preaching did not take place during those three days, while his body was lying in the grave, nor did his *soul* only go down to the prison, but "his soul reunited to the body"—for he was *quickened*! Christ's journey to prison, then, falls between his being quickened and his resurrection, i. e., *likewise* on early Easter-morning. As such a "quickened one in spirit," i. e., as one having acquired new life—a spiritual life[1]—he went and preached, or better: "he going preached" (πορευθεὶς ἐκήρυξεν). And what did he preach? The "contents" of Christ's preaching is not given here. We are therefore obliged to determine the exact nature of this ἐκήρυξεν from the context. The word κηρύσσειν expresses simply the idea that Christ "was a herald," or "officiated as a herald," or "proclaimed something after the manner of a herald." A herald always acts in the name and upon the command of a *higher person*—hence whatever Christ proclaimed or heralded must have been something which he had received from someone else, something to which he was authorised. That this "something" cannot have been the "gospel" follows from the following consideration.

1. "To preach the gospel" is expressed in the New Testament *always* by εὐαγγελίζειν.

2. The verse in 1 Peter iv. 6: "*For unto this end was the gospel preached even unto the dead*" does not help us very much either, for "the dead" are those who were *alive* when the preaching took place, but who died in the meantime. Besides that, we have for the "dead" the word νεκροῖς,[2] and for to preach not κηρύσσειν but εὐαγγελίσθη.

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[1] This is the common explanation of the phrase, which, however, does *not* explain the difficulties involved, see my article on Jahveh!

[2] And not πνεύμασι or the "souls separated from the body"!

3. Whenever the contents of the proclaiming or heralding are given, this is expressed by an *object* which follows the verb κηρύσσειν. Thus we have to preach: "Moses," Acts xv. 21; "circumcision," Gal. v. 11; "the word," Mark i. 45; "the gospel (of the kingdom)," Matth. iv. 23; Mark xvi. 15; "baptism," Mark i. 4; "repentance and remission of sins," Luke xxiv. 47; "Christ," Acts viii. 5, and it is used of "*an angel* as God's herald" in Rev. v. 12.

4. Suppose, for the sake of argument, that Christ indeed *preached the gospel* unto the spirits in prison in order to give them a last chance to get out of it—but then we would be again in straight contradiction to the parable of the "rich man and poor Lazarus." What this parable wants to teach us is this: the "*time of salvation*" is *here upon earth*, not after death: "*They have Moses and the prophets, let them hear them.*" If they hear them and do accordingly, they will be saved, if they do not listen to them they lose all chances of their salvation! Hence there was not and could not be offered to the "spirits that are in prison" a *last chance*!

This last consideration leads us over to the next point of our inquiry, viz., to the question with regard to the meaning of the "prison," φυλακή.

This prison appears here as a kind of "keeping-place," a place where the "spirits," the "souls separated from their bodies," the *ekimmu* or *utukku* are to be found. The *ekimmu* and *utukku* have, according to Babylonian ideas, their abode in the "nether world"—a place which was considered to be (within) the "*earth.*" It would therefore be natural to suppose that this place, the nether world, Hades, place of departed spirits, be also meant here. If it be, then it has to be subdivided again—according to the parable of the "rich man and poor Lazarus"—into two subdivisions: (1) a seemingly *comfortable* place, which is called in that parable: Abraham's bosom (κόλπος Ἀβραάμ); (2) an *uncomfortable* one or Hades proper. In the former we find Lazarus, in the latter the rich man. Both of these men arrive in their respective abodes as soon as they die:

> "And the beggar died, and....was carried away by the angels into Abraham's bosom, and the rich man also died, and was buried....and in Hades he lifted up his eyes, being

in torments, and seeth Abraham afar off, and Lazarus in his bosom!"

If the "prison" of St. Peter be the same as the Hades with its two subdivisions, the question may be asked: Did Christ go to the "uncomfortable" or the "comfortable" part of Hades in order to preach? According to St. Peter Christ preached "unto the spirits in prison, which aforetime were *disobedient.*" The assumption, therefore, might seem to favor the view that he went to Hades proper, the uncomfortable place, the abode of the rich man. Granted he went to this place, and granted also that he preached the gospel to the spirits in this "place of torment" in order to give them a last chance to secure their salvation, then again we would be in contradiction to Christ's express statements, who quotes Abraham as saying:

> "And beside all this, between us and you there is a great gulf (χάσμα μέγα) fixed, that they who would pass from hence to you may not be able, and that none may cross over from thence to us."

In other words: there is "no getting out" any more—those that are in Abraham's bosom remain there for ever, and those that are in Hades proper cannot be transferred any more to Abraham's bosom! Hence if Christ had indeed preached the "gospel to the spirits in Hades proper" he would have done something which was —to say the least—useless, for he knew that he could not help them! From this it follows that Christ did not and could not have preached the *gospel*, nor did he or could he have gone to Hades proper, the uncomfortable place!

Above we saw that the verb κηρύσσειν simply expresses the idea that Christ as the messenger of a higher person, heralded or proclaimed something. This he did immediately after his "being quickened in the spirit"—after having acquired a new (spiritual) life. With his being quickened Christ's battle against the powers of darkness: death and grave comes to an end. It is the assurance that he has become the victor, the king not only over death but also over life. As such a king over life and death it behoves him

to sit in judgment over the life and death of the spirits in prison—and not only over these, but also over that of all mankind. Christ's heralding—because it cannot be a preaching of the gospel—must therefore express the idea that He as king over life and death has now also the fates with regard to the life and death of the whole of mankind and in particular of the spirits in prison in his hand. He instantly exercises the powers that belong to him: he sits in judgment over the fates of the spirits—he becomes what the Babylonians would call a *mushîm shîmâti*, i. e., "one that determines (and destines and seals) the fates." As such a *mushîm shîmâti* he is a herald—one that acts for another person. This "other person" is, as we shall see shortly, "the great gods," or in New Testament language "God the Father."

Judgment, however, is not passed except in a place especially set aside for this purpose. This place is called here "prison"; as such it is a house, a room in which the spirits are "kept" to await their judgment, and has, therefore, nothing to do with *Hades*. We shall hear more about this room when we come to speak of the Babylonian Ubshugina.

If we sum up our results they would be the following: Christ died: body and soul were separated, this separation lasted for three days! On the third day his body and soul were reunited again: he was quickened in the spirit—acquired a new spiritual (?) life. This took place on early Easter-morning. But not only the quickening occured at this time but also his "showing or his proclaiming himself as the victor," and his resurrection. The proclaiming himself as victor took place in a room called "prison," where the departed spirits were kept, held for judgment. By this heralding the *fates* of the spirits were sealed or determined,—Christ becomes thus a Babylonian mushîm shîmâti, i. e., "one who determines the fates," as such he acts again as "herald," i, e., as one commissioned by a higher authority, which latter are the gods. After Christ had "determined the fates" of the spirits in prison, he rises. He could and did rise, because he was man. Man again can and does rise because he is part of "nature," and nature demonstrates to us every year in the spring that "the dead do rise to new life"

—hence as there is a resurrection of *nature*, so there is and was also a Resurrection of Christ!

That this doctrine of the Resurrection cannot have its source in the Old Testament is now admitted by all who made this the subject of a special investigation; see here especially Professor Gunkel's article in *The Monist* for April, 1903, pp. 417–419 and 439–440, where he considers the resurrection of Christ and his descent into Hades, inclining to the belief that these doctrines were brought to Judaism from "a stellar religion in which it was the ideal of the faithful to be snatched away from the transitoriness of the earth and to become like unto the ever-beaming divine stars." And a little further below he says (p. 419): "It is well known that the belief in life after death has long been present in a number of Oriental religions, for example, the Egyptian and the Persian, and that the whole Orient was filled with it at the time of which we are speaking. It is not remarkable that Judaism also finally adopts this belief, but rather is it strange that it resisted the belief so long." Indeed, it is strange that Judaism did resist this belief so long, seeing that the belief in the resurrection existed among the Babylonians as early as the time of Gudea, patesi of Shirpula, at about 3200 B. C.

But some one may say that there are several passages in the Old Testament which *do* show that the Hebrews did believe in a resurrection, quoting especially the familiar passage in Job xix. 25: "I know that my redeemer liveth, etc." Professor Gunkel, when speaking of this passage, remarks quite rightly, all we can gather from this passage is that "Job thinks for a moment of the possibility that God may justify him even after death" (*loc. cit.*, p. 417). On account of the importance of this doctrine it would seem advisable to examine the several passages of the Old Testament more closely and see whether we cannot detect in them at least *some* traces of a belief in a resurrection and a life after death.

The several passages of the Old Testament with regard to a life after death and a possible resurrection may be divided into three classes:[1]

[1] Conf. for the first two classes especially Cheyne in his *Encyclopædia Biblica sub* "Eschatology," Vol. II., pp. 1340, 1341.

1. Those according to which the "state" after death is a continuation of the life upon the earth. According to this view the dead possess a certain degree of self-consciousness, retain their power of speech and movement,[1] have knowledge, are therefore called ידעונים = "knowing ones";[2] they not only know what happens upon the earth, but they also take an interest in the fortunes of their living brethren: "Rachel weeps for her children,"[3]—as if she knew what had happened to the Jews during the time of their captivity; they know the future,[4] whence they were consulted about it by the living. And because this life after death is simply a continuation of the life upon the earth, therefore it is natural to expect that the prophet should wear his garb of distinction, the mantle, even in Sheol.[5] Kings appear here with crowns and sit upon thrones,[6] the uncircumcised retain their foreskin, nations their national garb and customs,[7] old people their gray hair,[8] and those slain with the sword bear forever the tokens of a violent death.[9] Cheyne, no doubt, is right when he calls this view "*the older.*" Of a resurrection we hear in these passages not a single word, although they clearly prove that with death life has *not* come to an end.

2. Those that express a *later* idea and are as such *diametrically opposed* to the former. According to these, death is destruction,[10] and destruction is Sheol,[11] or also called (the place of) *violence*,[12] a place out of which "*he that goeth down shall come up no more*,"[13] a place not only where "kings," "counsellors of the earth," and "princes" are to be found, but also where "*the wicked cease from troubling*, and where "*the weary are at rest*," where "*prisoners are at ease together*," "*the small and great are there, and the servant is free from his master.*"[14] It is indeed a place for all classes and conditions of men! There "*Abraham knoweth us not, and Israel doth not acknowledge us*,"[15]—the dead therefore have absolutely no knowledge of what is happening or going on upon the earth!

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[1] Isaiah 14. [2] Lev. xix. 31. [3] Jerem. xxxi. 15.
[4] 1 Sam. xxviii. 13–20: Saul and the witch of Endor.
[5] 1 Sam. xxviii. 14. [6] Is. xiv. [7] Ezek. xxxii.
[8] Gen. xlii. 38. [9] Ezek. xxxii. 25. [10] Job xxviii. 22. [11] Job xxvi. 6.
[12] ψ cxv. 17. [13] Job vii. 9. [14] Job. iii. 14 ff. [15] Is. lxiii. 16.

Especially important is here the passage in Job xiv. 7:

"For there is hope of a tree, if it be cut down, that it will
sprout again,
And that the tender branch thereof will not cease.
Though the root thereof was old in the earth
And the stock thereof die in the ground,
Yet through the scent of water it will bud
And put forth boughs like a plant.
But man dieth, and wasteth away:
Yea, man giveth up the ghost, and where is he?
As the waters fail from the sea
And the river decayeth and drieth up,
So man lieth down and riseth not:
Till the heavens be no more, they shall not awake,
[Nor be roused out of their sleep.]

What a difference between Job and St. Paul! Both employ the same method of reasoning,—but how different are the conclusions reached. For St. Paul it is just the nature which proves conclusively that there is a resurrection, but alas! for Job the tree, though the root thereof was old, and the stock thereof die, will bud again, but man when he dieth will never rise again! Two arguments, though both based upon the phenomena of nature, lead to two diametrically opposed conclusions! And because there is absolutely no hope for man after death, therefore argues Ecclesiastes (ix. 5 ff.) in his pessimistic spirit:

> "Eat thy bread with joy, and drink thy wine with a merry heart; for God hath already accepted thy works.... Live joyfully with the wife whom thou lovest all the days of the life of thy vanity, which he hath given thee under the sun, all the days of thy vanity: for that is thy portion in life, and in thy labor wherein thou laborest under the sun. Whatsoever thy hand findeth to do, do it with thy might; for there is no work, nor device, nor knowledge, nor wisdom, in the grave, whither thou goeth."

Dark, very dark is the outlook indeed, which men have ac-

cording to this view! No life, no joy, no resurrection after death! With the death everything comes to an end.

3. And yet, there are some passages in the Old Testament which do indeed betray to us a belief in a deliverance out of the grave! All these passages, however, belong to the very latest portions of the whole Old Testament writings. Now it is not necessary to construe with Professor Gunkel (*Monist*, April, 1903, p. 487) such sayings as meaning that "the faithful expects in this connection not the resurrection from the dead, but rather something very different, namely that God will save him in *present danger* and not permit his soul to go down into Sheol (the grave). This explanation might possibly hold good of such passages as:

"God will redeem my soul from the power of Sheol" (ψ ixl. 15).

"For thou wilt not leave my soul to Sheol" (ψ xvi. 18).

But it never could be applied to ψ xxxvii. 28:

"For the Lord knoweth judgment
And forsaketh not the saints
They are preserved *for ever*
But the seed of the wicked shall be cut off."

This "for ever" clearly shows that the psalmist not only believed that God could and would preserve the soul of the saints in *present danger* but *continually*, always and always, for ever and ever, unto all eternity.

Meagre and few as these passages are, yet they help us to follow up the path that leads us to the source whence such a view possibly might have been important. These passages, belonging to the latest portions of Hebrew literature, and as such having been written *after* the *Babylonian* captivity, point thus to *Babylonia* as their source.

Quite recently Zimmern, in his K. A. T³. p. 638 *et passim*, saw fit to make the statement, "von einer Auferstehungslehre ist bis jetzt wenigstens keine sichere Spur in der babylonischen Litteratur zu finden." That this cannot be maintained any more now I hope to be able to show.

We have seen above[1] that Enlil, the husband of Ninlil, was the "heaven," while his wife was "the earth." This "wife" had in the three lists, transcribed above, different names, among which there was to be found one, viz., *dingir Gâ-ra*, i. e., *Muallidtu* or "the one who brings forth,"—a name which is even found in Herodotus i. 131, 199 under the form Μύλιττα.[2] In our *Creation-Story*, p. 19, we heard that the wife of Enlil had several names even in the oldest Sumerian inscriptions—such as: (*a*) *dingir Nin-tu*, i. e., the divine mistress of the TU or "*bringing forth*" (= *alâdu*), therefore she is also called "the *mother* of the gods"; (*b*) *dingir Nin-in-si-na*, "the *mother* of the world (or people), who created the creatures of the world," but especially (*c*) *dingir Ba-ú*, who as the wife of Enlil becomes thus the *earth*. Now it happens that we read in several inscriptions of Gudea, the patesi of Shirpurla, who lived at about 3200 B. C., of a "wedding" of Nin-Girsu, the god of rain, thunders, and lightnings, and *dingir Ba-ú*.[3] This wedding was celebrated on the *New-Years-day* of the month called *Ezen-dingir Ba-ú*, i. e., "the festival of Bau." The significance of this wedding-celebration becomes at once plain! *It is the fructification of the earth by the rain in consequence of which the earth is made pregnant and brings forth new life. Ba-ú* becomes thus not only an *AM* or mother, a *muallidtu*, one "that brings forth," but also a *dingir Nin-din-dug*,[4] a Sumerian name, which when translated into Assyrian would be = *muballitat mîti*,[5] i. e., "*the one who quickens the dead.*" That which she quickens, restores to new life, are "*the green things of the earth*"

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[1] See also C. S. p. 52.

[2] See also Jensen, *Kosm.*, pp. 294, 515. Zimmern, K. A. T[3]. pp. 423, 7; 428, 4.

[3] Gudea, Statue G. II. 1–7; III. 6 *v. u*: *Ud-zag-mu ezen dingir Ba-ú ni(g)-gal-gish-sa ag-da*; IV. 18.

[4] If Ba-u is able to quicken the *dead*, then, of course, she has the power to "restore to health the sick" also. Cf. Craig, *Relig. Texts*, I. p. 18, 5–6: *dingir Ba-ú mù nam-ti-la shub-ba shag-gig-ga-ge* = *dBa-ú-ditto na-da-at shi-pat ba-la(l)-di ana qi-its lib-bi*, i. e., "Bau who giveth the salvina of life to the sick heart."

[5] This name is also given to the goddess Gula—a name which was originally only an attribute of Ba-ú, and meaning as such "the great one," *rabîtu, shurbûtu*. In the oldest texts Gula appears still used as an attribute, has therefore not the sign for god prefixed to it, see E. B. H. p. 443.

—hence the name *Ba-ú*, i. e., "the giver (*ba*) of *u* = green things.[1] Such a fructification and vivification of the earth can only take place in the spring. Hence during that time which precedes the spring *the earth*[2] as well as *Nin-Girsu must be fruitless, barren, or dead.* The time that precedes the spring is the winter. In *winter* then both "the earth" and the "god of rain and thunder and lightning," must be dead, must lie in the grave. Now we understand why Gudea records repeatedly in his inscriptions that he built for Nin-Girsu in the temple *É-ninnû-dingir Im-gig-ghu-bar-bar* also a so-called Gi-gunu[3] out of cedar-wood. This Gi-gunu appears in IV. R. 24, 4*b*[4] not only in parallelism with É-kur and with Arallû, i.e., the "nether world," but is called there even the *ashar la naplusi*, i. e., *"the place of the not-seeing*, i. e., where one does not and cannot see = the place of darkness. Nin-Girsu then dies every year and goes to the Gi-gunu. Here he is during the winter. In winter he is dead: there are no rains, thunders, and lightnings at this time! But in *spring* he is quickened and rises again, this he indicates by his first lightnings and thunders that even at our present times take place in the early spring. As soon as he is quickened, he rises and marries the *mother* earth, i. e,, Ba-ú: the warm rains of the spring unite themselves with the earth, who becomes pregnant: in consequence of this pregnancy the dead things of the earth are quickened, they rise and new life sprouts! If this wedding could take place in the spring *only*, and if this was at the same time "the New Year's day," it follows that already at Gudea's time or about

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[1] *á* in this signification has according to the syllabaries (see Br. List, 6019, 6027) probably the pronunciation SHAM; we ought to read therefore Ba-sham. This latter reading seems to be implied also in Reisner, *Hymnen*, p. 89, 12; 83, 9 (cf. l. 28): *ugun-mu dingir Ba-ú-MU*, where the MU can hardly be taken as a pronoun (= "my"), but where it seems to contain the overhanging vowel = *Ba-sham-mu.*

[2] See here especially the drastic description of the "deadness" of nature while Ishtar (= Innanna, another name for Ba-ú, C. S. p. 20) is in the nether world, i. e., while she is dead, barren, while it is winter: Ishtar's descent, K. B. VI[1]. p. 86, Rev. 6 ff.

[3] See E. B. H., Index, *sub* buildings, and Gudea, Statue B, V. 15–19; Statue D, II. 7–III. 1.

[4] See Jensen, *Kosm.*, p. 185.

3200 B. C. the year began with the spring, with the first of Nisan, the vernal equinox,[1] and that the wedding of Nin-Girsu and Ba-ú is nothing but a spring festival celebrating the *resurrection of nature to new life!* It is a *Resurrection-festival.*

In view of this fact we now understand why Nin-Girsu should have become the "*god of vegetation*": he it is, who by his fructification of the earth produces vegetation, he is therefore the "god of the farmers." That Nin-Girsu was = Ninib has been recognised long ere this. Our investigations,[2] however, force us to abandon the erroneous idea that Ninib was either the South or Summer sun[3] or the East sun.[4] Ninib (because = Nin-Girsu) is the god of storm, rain, lightnings, etc., as such also a god of vegetation,[5] and a god of the farmers.[6] And just as Nin-Girsu quickens the dead, so it is said of Ninib: "Who has been brought down into the nether world, his body thou bringest back again."[7]

Nin-Girsu was the *ur-sag*, i. e., prime minister of Enlil, and as in the Old Testament the "angel of the lord" was in course of time identified with "the lord," so was Nin-Girsu, resp. Ninib, with Enlil! So it happened that when the Canaanites had invaded Babylonia and made themselves masters over it, Marduk displaced not only Enlil but also his "prime minister,"—both of whose attributes and functions were now attributed to him (i. e., Marduk).

Marduk's wife was Tsarpanitum, i. e., "the one who shines (like silver)," as such she was again identified with Ishtar (= Innanna, another name for the wife of Enlil). Now, it is strange to notice that the name Tsarpanitum should have become, according to the folk-etymology, Zêr-bânîtu, i. e., "the one who creates, pro-

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[1] This is the answer to Zimmer, K. A. T.[3] p. 514.

[2] See also my forthcoming article on Jahveh.

[3] Winckler, *Geschichte Israels*, II., 79.

[4] Jensen, *Kosm.*, p. 457 f.

[5] K. 133 Rev. 20 (A. S. K. T. p. 81): mit-cha-rish shumi-shu im-bu-u sham-mu (= ú-mu) ana shar-ru-ti-shu-nu = with one consent the plants called his (i. e., Ninib's) name to a kingship over them.

[6] Cf. here Engar = ikkaru = farmer; and ^{dingir}Engar = ^{dIM}Ninib. See also above!

[7] King, *Magic*, No. 2, 21: *sha ana arallê shûrudu pagarshu tuterra!*

duces, seed!" That this must have had a reason is, of course, evident! And what is the reason?

The spring-festival of the resurrection of nature, which was conceived to be (at the time of Gudea) a wedding of Nin-Girsu and Ba-ú, was transferred to Marduk who now took the highest place in the Babylonian pantheon,—it became a wedding[1] of Marduk and Tsarpanitu, which wedding likewise took place in the spring, in Nisan. This event was also considered to be a *tabú*[2] or *resurrection* of Marduk and the *beginning* of his "*kingship*"[3] upon earth. These facts alone help us considerably to explain more fully the nature of god Marduk. Marduk begins his *reign*, his *kingship* in the *spring*. What precedes the spring is again the winter. In winter, then, Marduk has no kingship,—he is *powerless*. In the *spring* he *rises*, during the *winter* he must be in the *grave*, must be *dead*. In the spring he "hastens to the brideship," i. e., he weds, he unites himself with Tsarpanitu. The result of this is again that Tsarpanitu becomes a *mother*, is fructified and vivified,—hence the Tsarpanitu becomes a Zêr-bânîtu, as such she *brings forth seed*. This she does because she takes the place of Ba-ú or Ishtar (=Innanna), the *earth*! The earth by wedding Marduk is made to produce the "green things of nature," and Marduk, who causes all this, is therefore called sha mîti bulluṭa irammu,[4] i. e., he "who delights in quickening the dead,"—therefore he has the name bêl balâṭi,[5] "the lord of life." These "*dead*," whom Marduk quickens can therefore be primarily only = "the *dead things of nature*,"[6] but came to include, because man is a part of nature, "mankind" also.

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[1] I-chi-ish ana cha-da-ash-shú-tu, i. e., he [*sc.* Marduk] hastened to the brideship. Reisner, *Hymnen*, p. 145, 8.

[2] Neb. VII. 24; Nerigl. I. 35; Jensen, K. B. VI.[1] p. 306; Zimmern, K. A. T.[2] p. 371.

[3] Ir-mu-ú ana sharru-ú-tu, i. e., he sat down for the kingship. Reisner, *loc. cit.*, l. 9.

[4] Zimmern, *Shurpu*, VII. 84.

[5] Zimmern, *Shurpu*, VIII. 71.

[6] Against Zimmern, K. A. T.[2] pp. 373, 639, who thinks that mîti here = Totkranke, Schwerkranke. But the √ מות never means sick, but *dead only*!

In another place[1] I have shown that Marduk was the god of *light*, —the light considered, however, not as an illuminating power, but as a *life-giving* principle. Marduk, the AMAR-UD, i. e., "the son of the sun," if he were an illuminator *only*, could never be called "dead" or "powerless" during the winter. The "*rays of the sun*" —for these are Marduk—are *dead* or *powerless* in the winter, because they do not give *warmth*.[2] Marduk, the god of light, becomes thus the god of the *warmth of the spring*,[3] because in the spring, when he is quickened again and rises, when he begins his "kingship" and enters into a wedlock with mother earth, the *rays of the sun become to be felt*,[4]—his power begins, the earth is fructified, brings forth fruit: the *dead things* of the earth are quickened, rise to new life. The fight of Marduk against Tiâmat appears thus as a fight of the light, i. e., the *warmth* (the summer beginning with the spring) against the darkness, i. e., the cold (the winter, chaos, when everything is barren, dead), which fight took place not only "in the beginning" on "the first spring," but which repeats itself every year and which will go on *ach-ra-tash nîshi la-ba-rish ûme*^{me},[5] —for all eternity, for ever and ever. After having overcome his enemy, the winter, and thus made the creation possible, Marduk receives the highest honor which a god can or may receive: he is henceforth called by the *name* of that ancient Sumerian god, viz., *En-lil*, the "king and father of the gods," the "king of the lands,"[6] as such a "king" he also has the life and death of his people in his hands. He can now determine their fates, he is a mushîm shîmâti.

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[1] C. S. p. 5 f. = *Monist*, XII., 572; see also Jensen, K. B. VI.[1] p. 563, cf. *ibid.*, p. 562, and Jastrow, *Jewish Quarterly Review*, 1901, p. 638,—both these scholars have drawn my attention to these places.

[2] This against Jensen, K. B. VI.[1] p. 563.

[3] The idea that Marduk be the god of the early sun either of the day, or of the spring, or "at the beginning" when the world was created, ought now to be given up once for all, seeing that even the originator of the same, Professor Jensen, has himself abandoned it.

[4] In the winter they are *not* felt, although the sun is shining: Marduk is in the grave, is powerless, is dead, and is as such called Nabû! Marduk and Nabû represent thus the two halves of the year: summer and winter!

[5] K. B. VI.[1] p. 36, 10 f.

[6] K. B. VI.[1] p. 36, 13.

This latter point leads us over to another important event which took place in connection with this New Year's festival.

The resurrection of Marduk was celebrated by the people in this way:

Just as Marduk left the nether world—a place within the earth—so his statue left or went out (*atsû*) of the temple Esagil and was wheeled around on a ship[1] in solemn procession (*mashdachu*). This "wheeling around" took place on the most celebrated street in Babylon, the street Ai-ibur-shabum, i. e., probably, "not shall the dark one gain victory."[2] Especially sacred during this festival were the eighth to the tenth day, on which Marduk as the highest and as the spokesman of all the other great gods "determines the fates" of mankind in a place called *Du-azag*, which again was in another called *Ubshugina*. See here especially K. B. III. 2 p. 15 ff. (=Neb. II. 54.):

Du-azag, the "place of the destiners of fate," which is (in) Ub-shu-gin-na, the chamber of fates (=the room where judgment is given!), where at (the time of) the ZAG-MU-KU, the "New-Year," on the eighth (to the) eleventh day the "king of the gods of heaven and earth," the "lord of the gods," takes his abode (=sits down sc. for judgment), and where he, while the gods of heaven and earth reverently listen (?) and stand, doing homage to him, determines a fate of eternal days (to be) the fate of my life.[3]

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[1] That is: the ceremonies connected with this festival were such that went against "the common order of things,"—it was a festival "der ausgelassensten Freude," where everything went "upside down."

[2] Shâbû not="enemy" as Del. H. W. B. p. 637 wants, see Jensen, K. B. VI.[1] 335. The "dark one" is the "death," "winter," "chaos," "darkness," Tiâmat, etc.

[3] *Du-azag ki-nam-tar-tar-e-ne*
sha Ub-shu-(u)gin-na parak shi-ma-a-ti
sha ina ZAG-MU-KU ri-esh sha-at-ti
ûmu VIII^kam ûmu XI^kam
^dimmer Lugal-dim-me-ir-an-ki-a bêl ili
i-ra-am-mu-u ki-ri-ib-shu
ilâni shu-ut shamê irtsiti
pa-al-chi-ish u-ta-ak-ku-shu
ka-am-su in-za-zu mach-ru-ush-shu
shi-ma-at û-um da-er-u-tim

Du-azag means "bright or holy hill," and *Ubshugina* the "room of the assembling hand"[1]—we have, then, here a larger place within which there is a "hill." On this hill the great gods are assembled and determine under the presidency of Marduk the fates of mankind. Whatever may be the outcome of this *shimtu shimu*, this "determining of fates," Marduk declares it; he appears thus as a "herald" who although the highest god acts only with the consent of the other great gods!

Taking all these facts into consideration, the sequence of the events, connected with this New-Year's festival, has probably to be conceived of as follows:

1. During the winter Marduk is powerless, i. e., dead.

2. In the spring or in Nisan, which is the beginning of the New Year, Marduk enters upon his kingship again, i. e., he acquires new power, *new life*; is *quickened.*

3. As soon as he is quickened he rises—his quickening and his resurrection practically fall together.

4. Having thus been quickened and having risen, he unites himself with mother earth.

5. This union makes the earth "give up her dead"—the resurrection of nature is thus conditioned by Marduk's resurrection—if Markuk had not risen, nature (vegetation) could not rise to new life!

6. Marduk as the victor and conqueror of darkness enters in solemn procession the "holy hill" within the "room of the assembling hand" and determines here in the name of all the other great gods the fates of mankind.

This festival of the resurrection of Marduk and that of nature was celebrated every Nisan while the Jews were in the Babylonian captivity. Surely we must suppose that this spring-festival was known to the returning Jews, if we do not want to maintain that they were dead, absolutely dead, to their surroundings. We saw

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shi-ma-at ba-la-ti-ia
i-shi-im-mu i-na ki-ir-bi.

[1] Jensen, *Kosm.*, p. 240, translates this name by "Raum der Versammlung," but in this translation the *shu* is not accounted for.

above that we could detect in the Old Testament at least some meagre relics of a doctrine of the resurrection, which doctrine, however, in the New Testament holds almost the same place as it did in ancient Babylonia.

As Marduk had displaced old Enlil and his messenger, so Christ displaced Marduk. Marduk is the god of light—and Christ is the "light of the world," he was therefore made to have been born on the 25th of December—the festival of light—when the days begin to lengthen again and thus save the world from falling into utter darkness. Marduk was the light as a "life-giving principle," he died, and was in the grave during *three* double-months,[1] but rose again in the spring, on the first of Nisan, when he acquired new life, new strength, new power, and entered into a wedlock with mother earth, his wife, i. e., with Tsarpanitum or Ishtar. Christ, too, died, and was put into the grave, where he was for *three* days, but had to rise again on *Easter*—the festival of Ishtar.[2] By his resurrection he demonstrated that he, like Marduk, had overcome the powers of darkness (= the old dragon, the serpent!) and had entered upon his kingly rulership, and thus became the bêl balâṭi, "the lord of life." Marduk, however, not only rose himself, but *forced* by entering into wedlock with mother earth, this latter *to give up her dead.* Thus also Christ, if he really wanted to show that there began with *his* resurrection also *his kingly rulership* upon earth, *had* to force the earth to give up her dead—therefore it is said[3]:

> "And behold, the veil of the temple was rent in twain from the top to the bottom, and the earth did quake; and the rocks were rent; and the tombs were opened; and many

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[1] I. e., during the six months of the winter.

[2] Easter and Ishtar are one and the same word. It has come into the English language from the Germans, who worshipped the goddess *Ostara.* This Ostara was brought to the Germans from the Greeks, among whom the goddess Aphrodite, = Astarte, plays the same rôle as does among the Germans the goddess Ostara. This Aphrodite was called by Herodotus (see above) *Μύλιττα* and thus identified with the Hebrew Ashtoreh, who again is the Semitic-Babylonian Ishtar, and this the Tsarpanitu resp. Innanna or Bau!

[3] Matth. xxvii. 53.

bodies of the saints that had fallen asleep *were raised*, and *coming forth out of the tombs* AFTER HIS RESURRECTION[1] they entered into the holy city and appeared unto many!"

This passage proves, more than anything else, that there was transferred to Christ all that originally belonged to Marduk! Although we hear in these verses of all the circumstances connected with the death of Christ yet it said that "many bodies of the saints were raised, and coming forth out of the tombs *after his resurrection* they entered the holy city! According to Babylonian ideas there never could come forth the dead out of the earth at the death of Marduk. Matthew wanting to record the terrible earthquake in connection with Christ's death—an earthquake so terrible that even the graves were opened—feels that it was impossible to say that the "saints" rose while their life-giver was dead—hence he makes the addition "*after his resurrection.*" With Marduk's resurrection the resurrection of the dead was given, the dead could not rise if Marduk had not risen first—hence Matthew's statement: the dead rose after *his*, i. e., Christ's resurrection! Christ had to rise *first*—if Christ did not rise, then the dead could not rise. Neither could Christ rise alone, the *earth* had to give up her dead! And what a difference there is between this statement of Matthew and the reasoning of St. Paul! According to Paul, Christ did rise, because the dead rise, and the dead rise because nature proves it that there is a resurrection every spring. Matthew's conception of the resurrection of Christ is more in accord with the teachings of the Babylonian religion.

Marduk after his quickening and resurrection enters in solemn *procession* the "holy hill" within the Ubshugina and "determines the fates of mankind." Christ, too, after his being quickened sets out on a journey to the so-called φυλακή, the great "keeping-place." That this latter cannot be the "nether world" as such, but must be = the Ubshugina, the "room of the assembling hand," seems evident enough. Christ as well as Marduk were in the nether world while they were *dead*, while lying in the grave, i. e., during the three

[1] καὶ ἐξελθόντες ἐκ τῶν μνημείων μετὰ τὴν ἔγερσιν αὐτοῦ εἰςῆλθον εἰς τὴν ἁγίαν πόλιν.

double-months of the winter, resp. the *three* days that preceded Christ's quickening. During these days Christ's body was separated from the soul,—the former being in the tomb, the latter continuing to live as an *utukku*, resp. *ekimmu*, i. e.—according to the New Testament *usus loquendi*—as a "spirit." *After* these three days, i. e., *after* the time of Christ's being in the lower world, he goes to the "prison" not only as a "spirit" but as a "spirit reunited to its body," i. e., as a *quickened one*. If this "prison" were the "nether world," we would necessarily have to postulate *two* descents to Hades,—one while he was dead, the other while he was *alive*, quickened. Besides this, if Christ went to the "prison" as a quickened one, and if this latter (the prison) was the nether world, then the question would have to be answered, where was Christ's body, where was his soul during the three days of his death? We see, these difficulties force us to maintain the identity of the "keeping-place" or "prison" with the "room of the assembling hand." Marduk "determines here the fates of mankind," and Christ "heralds" something,—that this heralding or preaching could not have been a "proclamation of the *Gospel*," we saw above; hence the heralding can be only a proclamation of the fates of the "spirits" in prison. Christ appears here like Marduk as one "who determines the fates." If this be true, then we may also venture to decide the exact nature of the Ubshugina, resp. the prison. The Ubshugina is never identified, as far as I know, with the Babylonian Hades. Taking all the places in consideration where we hear something about the Ubshugina, we may say at the present[1] this much: It is a room in the temple of Marduk. This temple of Marduk called Esagila represents as each and every temple does "the world" or "cosmos," hence Ubshugina must represent also a cosmic quantity and as such be situated in the Cosmos. In the Ubshugina the Anunnaki are said to live. The Anunnaki, however, play an important rôle in the "judgment" of the departed souls. Hence the Ubshugina is the "place or room in which the souls of the departed are assembled" and where judgment is passed upon

[1] See also my forthcoming article on Jahveh, and cf. Jensen, *Kosmologie*, p. 239 ff.

them. This "judgment" is given by the great gods under the presidency of Marduk, who are therefore likewise assembled in the Ubshugina. While the gods thus "determine" what shall be done with this or that soul, they sit on the Du-azag[1] or "holy hill" which likewise is to be found in the Ubshugina. After the judgment has been passed, the "souls" are dismissed to the nether world proper, where they enjoy, resp. do not enjoy their fates. The Ubshugina, therefore, as well as the "prison," is the *judgment hall* for the departed spirits, and is as such situated likewise in the cosmos, more especially in the earth, and clearly distinct from the nether world.

Christ as well as Marduk, after having overcome the powers of darkness, and thus shown that they have power over life and death, take upon themselves instantly the functions of the *highest judge*, by "determining the fates." But not only this is their only reward: Marduk was made the highest god and called "*En-lil of the gods*," thus practically put at the head of all the other gods, so also Christ,—he was seated

> "on the right hand of God, having gone into heaven; angels and authorities and powers—i. e., the whole heavenly world—being made subject unto him" (1 Peter iii. 21).

Our investigations will have shown us, I hope, the following:

The doctrine of the Resurrection was known in Babylonia as early as 3200 B. C., at which time there was celebrated a spring-festival. This spring-festival was a marriage between "the rains of the spring" and "mother earth." In consequence of this marriage the earth became a *mother* and brought forth in due time "the green things of the earth": the vegetation. These "green things of the earth" as well as mother earth and the god of rain were also considered to be "*dead during the winter*,"—Nin-Girsu therefore had a *tomb* or *burial-place, the Gi-gunu*, for his abode during the time of his "death." This was again based upon the common phenomena of nature: during the winter there are *no* rains, no thunders, no lightnings,—hence Nin-Girsu must be dead. In the spring, however, with the first rolling of the thunders,[2] the

[1] See Jensen, *Kosmologie*, p. 234 ff.

[2] Mathew's statement about the earthquake in connection with the death of

people gathered that Nin-Girsu has been quickened again! Very soon there appeared also the first rains of the spring, who fructified the earth. As Nin-Girsu is not only the god of the thunder and lightning, but also that of the rain, this "raining upon the earth" was considered to be a marriage between the "god of the rain" and the "goddess of the earth." The resurrection of nature has thus two causes: the vivification or quickening of the god of rain (and mother earth) and the marriage relation between Nin-Girsu and Ba-ú. No wonder, then, that even at our present times this latter aspect should play such an important rôle at Easter, the festival of the Ishtar, i. e., the goddess of *love*!

At the time when Marduk was introduced into the Babylonian pantheon, these two aspects, i. e., the quickening and the marriage —were retained, only the *names* of the parties concerned were changed: Nin-Girsu, the god of rain, became Marduk, the god of light, and Ba-ú became Tsarpanitum or Ishtar. Besides these two ancient features there was introduced a *third* one. The new life of the nature was not merely considered to be the result of a *quickening* and a *marriage*, but they were made dependent also upon a *preceding fight*. The Canaanites before they could think of mastering the whole of Babylonia had first of all to *fight*, subdue their enemies. Marduk being their god, becomes thus the god who subdues his enemies. And as he subdued them once, so he always has and will continue to subdue them for all eternity. Marduk subdued Babylonia, conquered his enemies who lived there before him. With this subjugation the "new life," the new forms and governments of Babylonia were made possible. For these conquering Canaanites, Babylonia became the "world," *κατ' ἐξοχήν*, and Marduk their god, *κατ' ἐξοχήν*. Just as Marduk conquered the enemies of Babylonia, so he also *must* have conquered the old, old enemy of the "world,"—the Tiâmat, or chaos; just as with the subjugation of his Babylonian enemies the new life and development of "Babylonia" were made possible, so also was with his conquering Tiâmat the life and development of the "world." Mar-

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Christ *ought to have* occurred at his (Christ's) resurrection! Cf. the remarkable addition "*after* his resurrection"!

duk means according to his name AMAR-UD = "son of the sun," and is, therefore, a god of light, hence if he be the *light*, then his enemy can be only the *darkness*. Marduk's fight becomes thus a fight of the *light* against the *darkness*,—after having overcome the darkness the creation of the world is possible. But Marduk is not a "light" because it *illuminates* but because it *warms*, gives *life*, hence his enemy, the darkness, must be the winter! The fight of Marduk and Tiâmat thus repeats itself yearly: it is the fight of the *"rays of the sun"* in the *spring* against the *cold*! The "rays of the sun" gain in this fight the victory: the cold, the darkness is overcome, a new order of things is now initiated, the earth is forced to give up her dead, new life sprouts, the resurrection takes place!

Again a change of *names* takes place—but *only* of *names*! Marduk becomes *Christ*, Tiâmat = *"the old serpent, the dragon,"* and Tsarpanitum or Ishtar = who? According to analogy, Christ also ought to marry—an idea almost obliterated, but still preserved in allusions to the bride of the lamb, the personification of the Church.

Just as Marduk conquered the primeval dragon, Tiâmat, and created the world, so Christ *had* to create the world; just as Marduk rose as the god of light every spring, and married Ishtar or the earth, and fructified and vivified her, by means of which she *begat children* or *produced* new *life*, so did Christ because he too is the light. He *did* rise because he was = Marduk. Marduk is the *author* not only of the first creation but of every *new* creation, so is Christ: only *in* and *through* Christ men do rise. Marduk in consequence of his victory over the dragon was exalted, and received the *name* of *Enlil*, the *"father and god of the gods,"* the *"god of heaven and earth,"* the *Bêl* or *Lord*, κατ' ἐξοχήν, so Christ was taken up into the heavens and enthroned on "the right hand of God," for "God highly exalted him, and gave unto him the *name which is above every name* (!); that in the name of Jesus every knee should bow, of things in heaven and things on earth, and things under the earth, and that every tongue should confess that Jesus Christ is the *Lord*![1]

Our Easter-festival is the old, old spring-festival, celebrating the resurrection of nature, made possible by the victory of the spring over the winter. Nature does indeed rise, man is a part of nature, Christ is man, therefore Christ did rise! And the risen Christ is the Bêl, the *Lord*!

HUGO RADAU.

CHICAGO.

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[1] Phil. ii. 9 ff.

CHRISTIANITY AS THE PLEROMA.

THE HISTORICAL SIGNIFICANCE OF CHRISTIANITY.

HISTORIANS divide the development of mankind into two periods, which are separated by the appearance of Christ, and this method of chronology, counting the years backward and forward from Christ, as A. D. (*anno domini*) or B. C. (before Christ), is not limited to Church history, but is also universally used in profane history. No doubt it was introduced in Christian countries and at a time when Christianity was commonly accepted as the only universal religion. The division has once only been objected to and replaced by a new calendar—viz., during the time of the French revolution; but the old conservative powers overruled this innovation, and at present even the non-Christian countries have accepted the Christian chronology, not so much in recognition of Christianity as for the reason that they prefer to use a universal standard of reckoning events.

And is not, after all, this division justified? Does not the origin of Christianity with its universalistic tendencies, its ethical ideals, and its rapid spread over the historical nations of the old world, establish a new period in the history of mankind? Certainly we have to deal with a phenomenon that may be paralleled in other countries, but which on the soil of the Mediterranean civilisation was unprecedented. It is true that Buddhism in India is an historical phenomenon which in many respects furnishes significant analogies in the East to the development of Christianity in the West, but this parallelism only proves that the development of Christianity is not an accident, but took place according to a law of nature, nature to be understood in the most general sense,—a

law of the psychological development of mankind, a law that would find its application also in other worlds where different conditions may prevail.

No doubt wherever sentiency appears on any planet, animal life will in the progress of its evolution develop rationality, and the hearts of rational beings will be filled with cosmic emotions, taking shape in a belief in supernatural beings, that finally will result in monotheism. At the same time all creatures pine under the incessant sufferings of life; they will tremble at death; they will yearn for life immortal; and finding the body decay, and noticing that in sleep they appear to move about with an etherial body woven of the stuff that dreams are made on, they believe in a soul and they will long for an immortality of the soul. There is no doubt that human life on earth is only one instance of all sentient life in the universe, and though the conditions on other planets may be widely different, we may be sure that the inhabitants of other worlds will have the same geometry, the same arithmetic, (though it may not be based on the decimal system which is purely accidental, depending on the numbers of our fingers), the same moral ideals, the same social development, and also similar religions. Their whole progress, including their beliefs and dogmas and religious institutions, will be on the same line with ours.

Now in the course of the religious development there will appear after the long night of ignorance and wild struggles, the promising dawn of a glorious day of a general goodwill on earth. The religious longings and hopes, the prophetic promises, the moral ideals, first faintly foreshadowed in dark oracular utterance, will find their fulfilment. The world in former days was swayed by brute force, and cunning, egotism, greed, and ill will seemed to be the only factors that promised success. But in the time of fulfilment a religion appears that upsets the old order of things and proclaims the new ideal of benevolence, charity, and love.

Christ was hailed by the Apostle St. Paul as this fulfilment of the times (*πλήρωμα τοῦ χρόνου*, Gal. iv. 4; or *πλήρωμα τῶν καιρῶν*, Eph. i. 10) for in Christ was revealed the fulness of the godhead bodily (*πλήρωμα τῆς θεότητος*, Col. ii. 9).

The religion of fulfilment in India was Buddhism, in Palestine Christianity. And Christianity became the religion of the West; first of western Asia, then of northern Africa, then it spread over the whole Roman empire, whence it was carried to northern Europe and to all the European nations. Thus to them the appearance of Christianity is the pleroma of the times, the fulfilment of their religious ideals, the turning point of their history.

Christianity, not unlike Buddhism, its noble precursor and sister-religion of the East, is characterised by a spirit of universality. It ushers in a period of international ideals, international ethics, international religious truth, the main doctrine of which is expressed in the sentence, "Have we not all one Father?" And truly, are we not all brothers? Have we not all common duties, and should we not love one another, help one another, live for one another?

The dogmatic side of Christianity is of great importance, but the universality of its ethical ideals is more significant.

While we recognise that Christianity is something new in the history of the Mediterranean nations, we cannot be blind to the fact that the elements from which it is compounded are old. The contents of Christianity, its several dogmas, the forms of its institutions, and even its ideals, are old. They are new only in so far as they receive a new setting, being systematised and universalised. There is not one idea in Christianity which cannot be traced back to pre-Christian ages, or which has not been recorded here or there, or which has not been uttered by religious prophets and poets and philosophers of Jewish, Greek, Egyptian, Babylonian or other nationality. Christianity in fact is like the concentration of many scattered rays in one focus. The light of the past is gathered to one and the same point and shines now in undivided brightness. Thus Christianity, even if considered from a secular standpoint, is truly the pleroma of the religious history of the pre-Christian world. It necessarily became in the very form which it assumed, the fulfilment of the historical development of pre-Christian thought and, naturally enough, it appeared to the generations that lived in the

third and fourth centuries as absolute truth, as the fulness of God's revelation, and the solution of the deepest problems of life.

THREE ESSENTIAL DOCTRINES OF CHRISTIANITY.

The substance of the doctrines of Christianity was upon the whole fore-determined by historical conditions, but the way in which they were systematised depended mainly upon the center round which these ideas had crystallised, and this center was the personality of Jesus of Nazareth. A new religion was needed, and Christianity grew and spread over the whole western world; but Christianity was not the only applicant to fill the vacant place. Christianity had its rivals. History witnessed a short but bitter contest between several competitors, and it would not have been impossible that some other figure than Jesus had taken the central place in the new religion that was then in the process of formation. At one time the most powerful rival of Christ was Apollonius of Tyana, a noble personality, of whom legend and tradition told similar stories as of Jesus of Nazareth. He healed the sick; he comforted the poor; he raised the dead; he travelled from country to country preaching the belief in one god,—the universal god of all mankind, a god who was not in need of sacrifices; and Apollonius set an example to the world by his unassuming modesty, his renunciation and the purity of his life. At another time, Mithraism came dangerously near to being accepted as the state religion of the Roman empire. The Mithraists worshipped Mithra, the son of God, of Ahura Mazda, the Lord Omniscient, as the virgin-born, divine Saviour, as the Word, as righteousness incarnate, as the mediator between God and man, and as the king of the kingdom to come, who on the day of the resurrection will judge the quick and the dead. There were many other rival religions of a similar nature, and we may be sure that if a faith other than Christianity had gained supremacy, the religion of the world would in its main contents have become the same as Christianity. Even if the reformed paganism of Julian the Apostate had gained the day, the theology of the new religion would finally have become very similar to the theology of the Christian Church. Christians of later generations were

not reluctant in recognising the "Christian spirit" of Seneca, of Epictetus, of Marcus Antoninus, and even of Julian the Apostate, —so that Seneca could be believed to be a personal friend and disciple of Paul, that Epictetus and Marcus Antonius were said to be unconsciously influenced by Christianity, and that Julian the Apostate in his antagonism to the Church could be said to have adopted many good qualities from Christianity. Whatever the new religion that was needed might have been, one thing is sure, that it would have developed the doctrines of the trinity, of the god-man and god-incarnation, of the fatherhood of God and the sonship of man, of original sin, of the remission of sin by vicarious atonement, of the immortality of the soul, of the resurrection of the dead, of a day of judgment, of divine bliss in Heaven, of a punishment of the unamenable in Hell, and of the establishment of the kingdom of God on earth. All these notions were in the air and would have come out one way or another. They might have become somewhat different in detail in Mithraism, in a reformed classical religion, such as Julian tried to establish, or in the philosophical faith of Apollonius of Tyana, or in any Neoplatonic or Gnostic system, or in a reformed Egyptian religion in which Hermes-Trismegistos would have taken the place of Christ, but the general result would have been the same.

We will not investigate here why the belief in Jesus of Nazareth gained the day, nor will we underrate the importance of Jesus after he had become the centre of the new religion. We will only indicate that the belief in Jesus as given in the Gospel accounts and the Epistles of St. Paul offered views that were more human and humane, more practical, more ethical, more appealing to the hearts of the great multitudes in the Roman empire than those of other religions which competed with Christianity, and we do not hesitate to say that in the struggle for existence Christianity necessarily remained victorious; it was the strongest, the best adapted to conditions, the fittest for survival.

If Mithraism had become universally accepted, our theologians of to-day would study the Zendavesta and the Gathas; if Buddhism had reached the West, they would study the Pali books; if Apol-

lonius had been worshipped as the saviour of mankind, they would look up to Plato and Socrates as their prophets, but since the western nations are Christians, their theologians accept the Jewish Canon and the New Testament Scriptures as the highest authorities of God's revelation.

Leaving aside those features of Christianity which characterise it as different from its rivals, especially the personality of Jesus and the central position of Hebrew traditions, we will now limit our discussion to the most important general tenets that from the beginning, down to the modern days have been considered as characteristically Christian.

Christianity is the religion which recognises in Jesus, the Christ; meaning thereby that Jesus is God incarnate, that as such he is the mediator between God and man, that he is the King in the Kingdom of Heaven that is to come, the realisation of all ideals, that he is in one person, the priest and the sacrificial lamb offered for the forgiveness of sins, and finally that Jesus, having died on the cross, rose from the dead, and, having assumed a transfigured body which is no more subject to decay, is sitting now on the right hand of God, whence he will come at the end of the world to judge the living and the dead. Such is Christianity as accepted by all sects, with the exceptions perhaps of the Unitarians and similar Churches of later-born generations, and no one who does not accept these ideas will be accepted as an orthodox Christian.

Now when we consider one Christian doctrine after another, we shall find that none of them are absolutely new, and all of them were held, not by the Jews, but by the Gentiles as religious truths of great importance. It is true that among a few educated people of Greece and Rome the idea of vicarious atonement lost its hold; that religious thinkers, such as Plato and Apollonius of Tyana, repudiated sacrifices as not desired by the gods. Nevertheless, the large masses of mankind clung to them, which is best seen from the fact that the last pagan emperor, Julian Apostate, would not drop them from his worship of the gods. The practice of sacrifices had become offensive to the better educated class of people but the idea was not yet overcome. The belief in the efficiency of blood

atonement still lingered with the great masses, and even in Christian times we meet occasionally with relics of ancient superstitions, of burying people alive under foundation stones and other human sacrifices.

When we systematise the main Christian dogmas, we will find them to be:

1. A belief in an immortality of the soul, which was originally a hope of a resurrection of the body.

2. The consciousness of sin, and a yearning for its expiation, finding peace in the assurance of forgiveness through the bloody sacrifice of Jesus Christ on the Cross, based upon the conception of vicarious atonement; and

3. The idea of God-incarnation, viz., that Jesus Christ is at once true God and real man, that in him, the sinless man, the innocent sufferer, the ideal of human perfection, dwelleth all the fulness of the God-head bodily.

The three notions of immortality, vicarious atonement, and god-incarnation were deeply rooted in the minds of the people by a development of many thousands of years, for these ideas had been the very essence of pre-Christian beliefs, and unless they were satisfied, a religion would not have been deemed a pleroma, a fulfilment and realisation of the religious longing of the heart.

These three points are the essentials of all religion according to the notions of the people who lived shortly before and shortly after the beginning of the Christian era. At that time men longed for salvation from evil and death; they were anxious to remove the curse of sin, not by undergoing punishment themselves but by making a sacrifice that would appease the wrath of God or the gods, in a word, by vicarious atonement; and as they felt the need of supernatural assistance, they hoped for some god that would appear on earth and be a mediator between God and mankind. Hence the legends of the heroes, the saviours, the sons of Zeus or of other gods, Æsculapius, Theseus, Jason, Perseus, etc., Hor the god-child and avenger, Shamash, the sun-god and his labors, humanised in the Hebrew Sampson and the Greek Heracles, the ten

incarnations of Krishna, Hiawatha among the North American Indians, etc., etc.

Historians have again and again proved that Christianity is the product of either the Egyptian religion, or of the Babylonian religion, or of the Persian religion, or of some other Oriental faith, Brahmanism, Buddhism, etc.; and there is a truth in every one of these attempts. No one of these theories, however, is in itself alone sufficient and satisfactory, no one of them is complete. The truth is that all these religions contain the general elements from which Christianity has developed and the essential ideas can be traced in all religions with the exception perhaps of Judaism.

Judaism is a religion that stands unique among the religions of the old world. All religions have a tendency towards universalism. There is no god but its devotees declare him to be the creator and the ruler of the universe, the highest of the most powerful among the gods, and in the final course of religious development, other gods are identified with him so as to leave him the only one, the all-sustaining, all-pervading deity of the world. But here the Jews differed from the pagans: when their Yahveh had become the universal god, they regarded other gods as enemies of their own deity. It is true that every nation regards itself as the chosen people, so did the Egyptians, so the Greek, so the Babylonians, and Assyrians, but by and by this narrowness widens into a respect for others, resulting in cosmopolitanism. Among the Jews, however, the idea that they are the chosen people of God became a fundamental doctrine that would not yield. Yahveh though universalised into the creator and the ruler of the entire world remained the particular god of the Jews; and in Ezra we are assured that he created the whole world solely for the benefit of the Jews.[1]

A most characteristic feature of Judaism is its neglect of a belief in the immortality of the soul. The immortality of the soul is not specially denied but all vestiges of an official recognition of it

[1] See, for instance, 2 Esdras vi. 55, "All this have I spoken before thee, O Lord, because thou madest the world for our sakes"; and further down, vii. 10–11, "Even so is Israel's portion. Because for their sakes I made the world."

are carefully removed from the canonical scriptures of the Old Testament.[1] Judaism originated as a protest against the religion of the Gentiles. The Jews established a rigorous monotheism, which as a matter of principle rejected the idea of god-incarnation that filled all the religious stories and mythologies of the pagan world.[2] It rejected idolatry also as based upon a belief in god-incarnation, god being represented in a statue, the idol, to which as a symbol of his god the worshipper addressed himself. It rejected myth and mythology, and with it also the legends of the dying and resurrected god, the Thamuz of Babylonia, the Osiris of the Egyptians, the Adonis of the Greeek. No doubt the objections of the Jewish reformers were justified from their standpoint, for these legends were full of superstitious notions and led to practices that were little recommendable, but we cannot deny that the underlying ideas of paganism, the hope for an immortality of the soul and for a resurrection of the dead is fundamentally and essentially the same as in Christianity. The main difference between paganism and Christianity lies not in the single elements and doctrines, but in the setting of them. In place of many contradictory legends filled with erratic ideas and irrational notions, there is one simple story of a reformer who died a martyr's death on the cross. We have here the substitution of a realistic human life for the rambling romances of mythology, yet the general background remains the same with the sole exception that polytheism yields to monotheism; otherwise the events in the life of Jesus are interpreted in the light of the current religious traditions of the Gentiles—not of one nation, but of all.

Leaving out here a discussion of the doctrine of immortality we shall devote our special attention to the doctrines of the God-man as the Saviour and the vicarious atonement by blood.

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[1] For details see the authors article "The Babylonian and Hebrew Views of Man's Fate After Death," in *The Open Court*, Vol. XV., pp. 346–366.

[2] Mohammed, endorsing the strict monotheism of the Jews, declares, not without an unconcealed criticism of the Christian faith, "Allah is neither begotten nor a begetter." To him, as to any rigorous monotheist, the very idea that God can have a son is a symptom of paganism, of superstition, of heresy, and the utterance of it sounds like blasphemy.

THE GOD-MAN AS SAVIOUR.

The classical book which sums up the matured Christian idea of God-incarnation is *Cur Deus Homo*, by Anselm of Canterbury, a treatise which is recognised as an authority by all Christian Churches.[1]

It has always been praised as a masterpiece of clearness and logic, and we cannot help but admire the ability with which the good Bishop argues in favor of his belief. But all his arguments presuppose the old pagan notions of resurrection, vicarious atonement by blood and God-incarnation, and anyone who does not accept these three ideas as fundamental truths will naturally remain unaffected by Anselm's demonstrations.

Anselm's faith is ultimately derived not from the Gospels but by *a priori* reasoning from the three fundamental ideas above mentioned, and this greatest among great ecclesiastics, this leader in the realm of Christian thought and philosophy, expresses himself plainly in the preface. He declares of his treatise that it meets the objection of infidels as well as replies to the question of believers, saying:

"Leaving Christ out of view (as if nothing had ever been known of him), it proves, by absolute reasons, the impossibility that any man should be saved without him," and "likewise, as if nothing were known of Christ, it is moreover shown by plain reasoning and fact that human nature was ordained for this purpose, viz., that every man should enjoy a happy immortality, both in body and in soul; and that it was necessary that this design for which man was made should be fulfilled; but that it could not be fulfilled unless God became man, and unless all things were to take place which we hold with regard to Christ."

Anselm here lays the philosophical foundations of Christianity, which are independent of the Gospel, but will help to explain them and set the historical facts related therein into a proper light. Thus as stated in the quotation, he leaves Christ (that is to say, the Gos-

[1] A new edition of Anselm's main works containing the "Proslogium" and the "Monologium," both translated for the first time by Mr. Sidney Norton Deane, and "Cur Deus Homo," translated by James Gardiner Vose, has just been published by The Open Court Publishing Co.

pel narrative of Jesus) out of view, and relies upon "absolute reason," presupposing all the time the general notions of his time and the pre-Christian ages.

Man is a sinner, and so an atonement must be made for sin which of course must be in proportion to man's guilt. Sin is disobedience to God and is as such "the most heinous offence which not even God, on account of His justice, can forego." Divine justice for the sake of preserving its own dignity demands a punishment which in consideration of the heinousness of the offence can only be death. The sinner is doomed to eternal torments, and humanly considered, there is no way of escape. Man can be helped only by some supernatural power; and God in his infinite compassion has devised a means to help man. Humanity is one great family, one great organic unity, and as by one's man's guilt all become guilty, so by one man's virtue all may become ransomed. This idea, which is an application of the law of heredity to the domain of moral responsibility, furnishes a basis to the juridical theories of all primitive societies, and accepting it as a self-evident truth, Anselm declares that mankind can be saved only if God himself becomes man and pays the debt of mankind. The God-man is at once real God and real man. If he were not man, his sacrifice would avail nothing. If he were not God, he could not have accomplished the task. In this way, Anselm argues, God remains consistent. He remains all-just and all-good. Man's guilt is paid with blood, and the sinner may be ransomed from the power of evil.[1]

Man's nature is not intrinsically corrupt. He was created potentially good and potentially immortal. He is not necessarily subject to death (p. 241), the fall of man and his sin made him subject to death, but God will complete the work which he has begun (p. 242–244), but to accomplish his aim he must become a man of Adam's race (p. 247).[2]

Anselm's argument, that the second person of the trinity, God

[1] Page 232.

[2] We omit all details that are mere side issues, e. g., that God should be born of a virgin, and that man was created to make up for the fallen angels.

the Son, should take upon himself the task of incarnation, moves in a circle and may be considered as naïve, but here again we are confronted with his *a priori* method of reasoning, based upon the assumption that the second person of the trinity is God the Son. "If one of the other persons be incarnated," Anselm argues, "there will be two sons in the Trinity, viz., the Son of God, who is the Son before the incarnation, and he also who, by the incarnation, will be the son of the virgin." He comes to the conclusion that "it is more fitting for the son to be incarnated than the other persons" (p. 251). God becomes in Christ a real man, who, though made of a sensual substance, yet remains free from sin. If angels do not sin, they are without merit, but if a real man is free from sin, he deserves praise for his holiness. Thus God in order to deserve the glory of his victory over the devil, would have to become a real man with all the shortcomings and weaknesses of humanity.

The death of the God-man outweighs the number and the greatness of the sins of mankind (Chapter XIV., p. 261 ff.), and thus the ransom has been paid by the sacrificial death of Christ on the cross. It is a complete fulfilment of all the yearnings of pre-Christian religions, and Boso, the interlocutor of Anselm, the fictitious person who puts questions and raises objections, having listened to the arguments of the Bishop concerning the work of salvation accomplished by God the Son, exclaims:

> "The universe can hear of nothing more reasonable, more sweet, more desirable. And I receive such confidence from this that I cannot describe the joy with which my heart exults. For it seems to me that God can reject none who come to him in his [i. e., Christ's] name."

Such, in brief, is the Christian argument as summed up at the time of its highest development by a representative member of the clergy. It is the high flight of a prophetic soul, but as we analyse its sentiments, we find the same views prevalent in Egypt, Babylonia, and Greece. Osiris was dear to the Egyptian, because he had lived among them as a man, and he had passed through the same ordeal of death through which every mortal must go. His soul went down to the land of shades in the far West, and with the help of the arts of Anubis he was resurrected and attained to im-

mortality. Every Egyptian based in his dying-hour his hopes on the god. He identified his own fate after death with the fate of Osiris. Osiris died with him and he with Osiris. With Osiris he travelled to the Western abode; the divinity of Osiris protected him on the long and dreary journey. His body was mummified like the body of Osiris; and finally he regained life and vitality in the same way as did Osiris. Osiris had opened the way, and his faithful devotees can now follow him through the valley of death to a glorious resurrection, in which they shall be endowed with a new and shining body, and attain a state of glory or saintedness. Osiris was to the Egyptians, as Christ is to the Christians, according to St. Paul, the first fruits of resurrection.[1]

The idea of a god that lived as a man among men on earth, that died, and, having passed through the shadow of death, was resurrected, is not limited to Egypt. In its main outlines the same myth is repeated among almost all the nations of the world. Yea, the same nation tells the same story in different forms, and the same hero reappears under many different names. In Babylonia, we know of Thammuz, who is mentioned by Ezekiel (viii. 14)[2] as the god for whom the women were weeping on the festival of lamentation, and we know that his return to life was celebrated with a great rejoicing,—a Babylonian Easter.

The hope of the Babylonians for salvation was further expressed in the tale of Ishtar's descent to and her return from Hades. Bel Marduk also conquered the gates of hell and set free the prisoners so as to allow the dead to come out of the grave and rise to new life.[3]

In Asia Minor, Attis[4] took the place of the Babylonian Tham-

[1] The only complete source of the story of Osiris is found in Plutarch's *De Iside et Osiri*, but there are innumerable allusions to the myth in the Egyptian monuments and papyri to indicate that Plutarch's account is upon the whole correct.

[2] See also Baruch vi. 30. Ammianus (Mark xxii. 9) mentions Thammuz worship in Antioch, Theocritus (III. 28) in Egypt, Pausanies (IX. 41) in Cyprus. Cp. Strabo, XVI. 755, and Lucian, *De dea Syr.* 6.

[3] See Dr. Hugo Radau's article "Bel, the Christ of Ancient Times," in the present number of *The Monist*, pp. 113 ff.

[4] Aronobius, *adv. gentes* V. 4; Diodorus, III. 158; Servius, *ad Æn.* IX. 116,

muz, and in Greece he was called Adonis, a Hellenised form of the Semitic word אדון (Adon), i. e., "Lord."

Orpheus, Dionysus, Jason, Hercules, Odysseus, and many other gods, demigods, and heroes are one and the same figure, are god-incarnations of the same type.

The underlying idea is the spiritualisation of natural events due to a change of winter and summer. The hero is the sun or vegetation, or as is the case with Osiris, the Nile.

The form of the myth is different in different countries, but everywhere we can trace the same underlying idea of the god that dies and is resurrected.

Some myths travel, and if they are twice told in two different versions, we scarcely recognise their common origin. Shamash, the Babylonian sun-god, the Hebrew Sampson and the Greek Heracles, is also Odysseus who roams over the whole earth, descends to Hades, and comes again to the world of the living.

The birthday of the sun-god is celebrated at the winter solstice, while its death is placed at the summer solstice on the day of St. John the Baptist.

In some religions, the growing god and the waning god are two different persons. Sometimes they are represented as male and female. Sometimes the god is said to lose his power by having his hair cut off (Sampson), the hair representing the rays of the sun; sometimes he is supposed to be torn to pieces (Dionysos Zagreus); and sometimes the head is cut off (Orpheus).

Reminiscences of these religions are still preserved in Christianity, and the selection of Christian festivals has been made with special consideration of such pagan traditions. John the Baptist's festival was celebrated on the summer solstice, because it is the day of the sun's decrease, and Christ's birthday was fixed at the winter solstice, the day of the sun's increase.[1]

Thus the origin of Christianity is ultimately based upon the natural conditions of our planet. It originates with man's observ-

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Pausanias, VII. 17, 5. Cf. also Lucian, *De dea Syr.*, 51; Eusebius, *præp. Evang.* VI. 279.

[1] John iii. 30: "He must increase, but I must decrease."

ance of the laws of nature, of decay and growth, of inundation and drought, of winter and summer, of the course of the sun, its decline, its death and regeneration, and thus the constant reappearance of life in nature suggests to man the immortality of his own being.

The development of all these doctrines upon the basis of the Gospel narrative of the life of Jesus, and their systematisation into a system of theology was the task of the fourth and fifth centuries of the Christian era. The material of religious notions was given by pagan traditions, but these pagan views were purified in the furnace of Jewish monotheism. At the same time they were filled with ethical contents, for the ethical ideas of a general good-will or love and self-sacrifice had also spread over the Roman empire and were preached by many philosophers and moralists.

Pagan philosophers, such as Seneca, speak of Hercules and of other hero saviours in the same tone as Christians did of Christ. We read:

"Hercules never conquered for himself. He wandered over the earth not as a conqueror, but as a guardian angel. What indeed should the enemy of the bad, the protector of the good, the restorer of peace, conquer for himself on sea or on land?"—*De Ben.*, I., 13.

And the ethics of Greek and Roman philoshers do no not differ much from the injunction "Love your enemies."[1] Seneca taught:

"One should show the way to those that are erring, and with him that is ahungered one should divide one's bread."—*Ep.*, 95, 51.

And again he teaches to be:

"Towards friend pleasant, toward enemies mild and yielding." *De vit. beat.*, 20, 5.

Seneca's idea of moral perfection is expressed in his consideration of the death of Hercules on Mount Oeta. Only he can lift up mankind who has conquered the terror of death, and the good man must remain good even if goodness is rewarded with suffering.

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[1] See the author's article "On Greek Religion and Mythology," especially the chapters "The Fatherhood of Zeus" and "The Ethics of Returning Good for Evil," in *The Open Court*, 1901, January, Vol. XV., pp. 1–16.

This idea is expressed in many of his letters,[1] from which we quote the following sentences:

"If the good one perceives that true faithfulness is persecuted with the penalties of faithlessness, he will not descend from his height but will rise above the punishment, and say 'I have attained what I wanted, what I sought. I do not regret and never will regret.' By no misfortune shall fate compel me to express myself thus, 'What did I do for my own benefit? Of what use is now my good will?' Indeed this good will is still useful at the martyr's stake. It is useful even in the heat of the flame. When the fire touches the several limbs and gradually surrounds the living body, the heart which is filled with a good conscience may indeed melt, but such a fire by which genuine faith is illumined, will be pleasing to a man." (*De ben*, IV., 21–26.)

In one of his letters Seneca makes the ideal man say:

"I am burning but I remain unconquered. Why should that not be a desirable fate? Desirable it is, not that the fire burns, but that it does not conquer. Nothing is more glorious, nothing more beautiful than virtue; and good and desirable is everything which is achieved at virtue's request."

The good man considers his conscience alone; he is not afraid of contumely. Virtue rewarded is not yet put to the test, but virtue in infamy (*virtus cum infamia*) is sublime. Seneca says:

"I shall pursue with greatest equanimity an honest policy in the midst of infamy. No one seems to show a higher respect for virtue than he who loses the repute of being a good man without losing his conscience."[2] (*Ep.*, XXXI., 20.)

This is the same idea which Plato expresses in his description of the "perfectly just man" who remains good even though his eyes were burned out and he suffer the cruel death of impalement —crucifixion on the pointed pole.

In reading pagan sentences, we are apt to consider the events narrated in their mythology as fables, and we are apt to pity these heathens for taking comfort in illusions, but we forget that the myths of antiquity were as real, as genuine, and as true to the pagan as the narrative of Christ is to the Christian. We cannot doubt

[1] Michael Baumgarten, L. A., *Seneca und das Christenthum*, p. 82.

[2] See also *Ep.*, XII., 1, and CXIII., 32, and CXV., 6. Seneca praises the constancy of those who act according to this principle, Marcus Cato "*quo nemo altior*" (*Ep.*, XCV., 70, *de tranq.*, VII., 3, and XIV., 1) the philosopher Diogenes (*de ira*, III., 38, 1), Aristides, (*Ad Helv.*, XIII', 7, *De const.*, I., 3, *Ep.*, XIV., 13, *Ad Helv.*, XIII., 7, *De const.*, XIV., 3).

that the Egyptian derived a genuine comfort from his belief in Osiris. We cannot doubt that the Babylonian when putting his trust in Bel Marduk was perfectly serious, and the need of a new religion was only felt when in the general progress of civilisation, the several myths ceased to be believed. Since the time of Alexander the Great, the different nations led no longer isolated existences. They became acquainted each one with the other, they broadened; they lost thereby the implicit faith in their own traditions without at the same time gaining a higher view. The thinkers of the several local centers of the world compared the several religions and began to search after the truth that would hold good universally. They searched for a religion that would be the religion of all mankind. A fermentation spread over the religious world, resulting in the formation of religious societies seeking the light, searching for truth. Hence the rise of Gnosticism which is pre-Christian, and its finding utterance in many places and among men of different nationalities; and it is not to be wondered that the several religious movements, of the Therapeutæ in Egypt, of the Essenes and Sabians in Palestine, of the Mandæans in Syria, of the Ophites and other Gnostics, etc., etc., were quite similar, in spirit, in their institutions and doctrines.

The same spirit which animated Christianity had spread over the Roman empire shortly before the time of Christ. The formation of the Roman empire as a universal state under one government with one ruler paved the way for the one universal church. The idea of Cæsar as the representative of order and law, his deification as a living god, drove home to the people the idea of a god-man to whom is given all power on earth as it is in heaven. It seemed so natural to a Roman subject that there should be a vicar of god, resident in the capital of the world; and the idea was retained even among the Protestant nations where the king rules "by the grace of God." It is interesting to see how secular history shaped the mould from which the Church institutions were cast; but it is more noteworthy that the spirit of the new religion could be felt long before it assumed its definite shape, and thus we learn to understand why, for instance, the philosopher Seneca,

who lived and wrote before Christianity was heard of in Rome, and who died under Nero and was thus a contemporary of St. Paul,[1] could even in ancient times be regarded as a Christian author and the idea spread among the Christians that he must have derived his philosophy from Christian sources. The belief was current in the fourth century of the Christian era, that Seneca had exchanged letters with St. Paul. At any rate St. Augustine and St. Jerome make allusions to it, and a scribler of the Middle Ages made an attempt to construct such letters and palm them off on the world as genuine; but the imposition was too bold and they are regarded as unequivocally apocryphal.

Christian historians and philologists find traces of Christianity not only in Seneca,[2] Tacitus,[3] and Epictetus, but also in pre-Christian authors,[4] thus establishing the doctrine of God's educational plan, according to which mankind is being prepared for the advent of Christ not only by the Hebrew prophets but also by pagan sages.

Christianity was born among the Nazarenes, a sect which must have been closely allied to, if not identical with, the Essenes, and it passed at first as one Gnostic sect among the others; but the life history of Jesus, so impressed the people and appealed so powerfully to the great masses of the population, who were among all most eager for religious comfort and ready to accept a Gospel of the poor, that the new faith became popular at once and quickly overshadowed all other Gnostic sects.

The history of dogma proves how much theology dominated the Gospels, and not *vice versa*, the Gospels, theology. Gospels

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[1] The persecution of Christians under Nero seems to have been a persecution of Oriental religions which Tacitus wrongly identified with Christianity. It seems pretty sure that the name Christian was not coined before the end of the first century, and it took the Romans some time to distinguish Christians from Jews and other Orientals. See Dr. R. A. Lopsius *Ueber den Ursprung und den ältesten Gebrauch des Chrislennamens*, a memorial published by the theological faculty Jena in honor of Dr. Carl August Hase, 1873.

[2] Michael Baumgarten, *Seneca und das Christenthum.* Johannes Kreyher, *L. Annæus Seneca u. s. Bez. z. Urchristenthum.* Amédée Fleury, *St. Paul et. Sénéque.*

[3] Bötticher, *Das Christliche in Tacitus.*

[4] R. Schneider, *Christliche Anklänge aus den gr. und Lat. Kassikern.*

were accepted or rejected according to their theology; they were worked over and changed, omissions were made and additions inserted until they suited the demand and became acceptable. Yet even in their final shape, they are far from justifying the theology of the several self-styled orthodox Churches.

THE GOSPELS HISTORICAL.

The Gospels are in their bulk genuine. The nucleus of the narrative embodies a tradition which dates back to the generation of Christ and we may assume that the original text was written in Aramæic not later than the latter half of the first century. This theory is proved by such statements of the Gospel as would not have been received into the text by Gentile Christians. Jesus says for instance that his second coming shall take place before the present generation shall pass away[1] and he declares in unmistakeable words, "There are some standing here," meaning among the audience of the people whom he addressed, "who shall not taste of death till they see the son of man coming in his kingdom."[2]

This prophecy of the second advent of Christ which, it was most vigorously insisted upon, should take place during the time of the generation then living, was a most essential doctrine of primitive Christianity. The Apostle St. Paul is as unequivocal as Jesus in his statement that even he and his converts, or at least some of them, will not "sleep," but "be alive and remain" to be "caught up together with them [the resurrected dead], in the clouds to meet the Lord in the air."[3] The most critical doubter will concede that these passages must have been written when people still believed that the prophecy could be fulfilled.

Theologians have tried to restore the original Gospel, which is commonly called by German scholars *Ur-Markus*,[4] because the

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[1] Matt. xxiv. 34; Mark xiii. 30; Luke xxi. 32.

[2] Matt. xvi, 27–28. The passage refers to the second advent of Christ and admits of no other interpretation.

[3] 1 Thess. iv. 15–18, and 1 Cor. xv. 51.

[4] The method of reconstruction is well explained in Rev. Edwin A. Abbot's article on the Gospels in the *Encyclopædia Britannica*, Vol. X., esp. p. 793.

Gospel according to Mark contains most of that primitive narrative, and this original Mark is undoubtedly based upon facts, although we will have to grant that the historical Jesus is somewhat different from the Christ such as he is commonly represented to be.

The historical Jesus was a Jew to the backbone, and we have the statement from his own mouth that he believes in the absolute divinity of the law. He says, Matt. v. 18:

"Verily, I say unto you, till heaven and earth pass, one jot or one title shall in no wise pass from the law."

This passage stands in flat contradiction to the declaration of St. Paul, that the law has been fulfilled and is therefore no longer binding, that circumcision is a means of education only in the religious development of mankind and must be considered as abolished because fulfilled in Christ. Thus Christ's word was a puzzle to the Gentile Christians who looked upon the Jewish law as only of temporary and local significance, and so a copyist added to Christ's words the clause "till all be fulfilled," a clause that is missing in the best manuscripts and, moreover, is grammatically out of place because Jesus says expressly, "Till heaven and earth pass away," which is quite different from the other "till all be fulfilled."

The same spirit of a narrow Judaistic spirit crops out in other passages, and we may look upon these traits which Gentile Christians would not have superadded to the original text of the Gospel as most primitive and historically true. Jesus declares most unequivocally:

"I am not sent but unto the lost sheep of the house of Israel." Matthew xv. 24.

And when sending out his disciples, he expressly warns them not to go to the Gentiles, saying:

"Go not into the way of the Gentiles, and into any city of the Samaritans enter ye not.

"But go rather to the lost sheep of the house of Israel."

Jesus calls the Israelites "children" and the Gentiles "dogs," and heals a Canaanite woman's daughter, only making an exception

for once from his rules, on account of her persistence and strong faith.

The passages Matt. xxviii. 19–20, and Mark xvi. 15, in which Jesus proclaims the universality of Christianity, were spoken not by Jesus in his lifetime but after the resurrection, and are even by the most orthodox critics conceded to be very late additions.

There is, further, not a word in the Gospels which teaches the doctrine of Christ's sacrificial death and vicarious atonement. This conception of the crucifixion is entirely due to St. Paul's interpretation.

Moreover, the doctrine of the trinity was so universal that the Christians accepted it without much argument; nor did they find any special and unequivocal statement of it in the Scriptures; but it would not be wrong to say that it is presupposed in the New Testament. The idea that God must be trinitarian was common among all the nations of the East, nay, of the world. In every Egyptian temple God was worshipped in a trinitarian form. Even the local divinities in the valley of the Nile appeared as triple personalities or as families of three, e. g., Osiris, Isis, Hor; and the same is true of Babylonia where every religious system adopts the trinitarian theory, e. g., Ea, Anu, and Bel; nay, even in India and in China the same tendency prevails. The Brahmans worship Brahma, Vishnu, and Shiva; and the Buddhists the three gems, the Buddha, the Dharma, and the Sangha. Taoist temples form no exception; they erect altars to the three Holy Ones. In fact, the trinitarian idea of the Godhead is almost universal, and we can understand, therefore, how the trinitarian dogma was accepted by the Christians even without the special endorsement of Scriptural authority, almost as a self-evident truth.

The New Testament contains no theory of the soul, nor any specified doctrine of immortality. But it is noteworthy that immortality is conceived as a resurrection of the body, and even the apostolic confession of faith emphasises this materialistic belief in the resurrection of the flesh. The custom of burial has been adopted in preference to the method of burning the dead, solely because the idea prevailed that the very body of the deceased will

rise on the day of judgment from the grave and be reanimated to new life. In fact, the hope that the second coming of Christ would take place during the lifetime of the first generation after Christ, and that the flesh and blood should be transfigured into an immortal body without seeing death, was one of the favorite doctrines of St. Paul himself. Yet after all, Christianity established the theory of the immortality of the soul (or rather a resurrection of the body) not because Christ taught it, but because the belief was generally accepted in the Gentile world.

The influence of the pre-Christian notions upon the history of the Christian Church is noticeable in almost all the dogmas, but most especially in the doctrines of incarnation that Christ is God and man in one person, and of vicarious atonement by the blood of Christ.

HUMAN SACRIFICE AND VICARIOUS ATONEMENT.

It is frequently claimed that the dogma of vicarious atonement as well as the deep consciousness of man's guilt (the theological conception of sin) is an exclusively Christian idea, but such is not the case. On the contrary, the idea that all evil, disease, pain and all great misfortunes are due to sin, and that sin is whatever gives offence to God, or the gods, and that their favor must be bought by supplication, prayer, penance, or sacrifice, was wide-spread. The greatness of man's guilt demanded a severe punishment, and people thought that nothing but blood, the most precious thing on earth, would be acceptable to the gods.

The Ancient Babylonians have penitential psalms which compare favorably with the same productions of Hebrew literature.

The Babylonian psalmist when suffering under a visitation without being conscious of guilt, exclaims:

"The sin that I have committed, I know not."

And in the same strain, the Hebrew poet exclaims:

"Who can understand his errors? Cleanse thou me from my secret faults" (Ps. xlx. 12).

A Babylonian hymn expresses the penitential sentiment in these lines:

"O Lord, do not cast aside thy servant
Overflowing with tears.[1] Take him by thy hand.
. . . . . .
The sin I have committed, change to mercy.
The wrong I have done, may the wind carry off!
Tear asunder my many transgressions as a garment,
My God, my sins are seven times seven, forgive me my sins."[2]

Man in his penitential disposition clamors for atonement, and the atonement is mostly made in blood. The prophet Isaiah opposes the festivals of his people, speaking in the name of the Lord.

"To what purpose is the multitude of your sacrifices unto me? saith the Lord: I am full of the burnt offerings of rams, and the fat of fed beasts; and I delight not in the blood of bullocks, or of lambs, or of he goats" (i. 11).

Similar opinions are now and then voiced in Hebrew literature,[3] but they are not intended to suppress bloody sacrifices, they only insist on righteousness as a condition without which God is not pleased with offerings. Says the Psalmist:

"Then shalt thou be pleased with the sacrifices of righteousness, with burnt offering and whole burnt offering: then shall they offer bullocks upon thine altar."

Bloody sacrifices continued at Jerusalem until 70 A. D., and at the time of Christ the temple was more like a slaughter house than a holy place. Innumerable sacrifices were offered upon its altar almost daily, and the blood of rams and bullocks reeked to heaven.

According to the Jewish law, sacrifices could be made only in the temple and not in the synagogues. The synagogue was merely a meeting house in which pious Jews assembled for prayer, Scripture-reading, and sermons.

The destruction of the temple made an end of bloody sacrifices among the Jews, and now even if the temple of Jerusalem would be built up again,—which is by no means an impossibility, considering the obstacles to be overcome and the cost, —yet even if the temble were rebuilt, it is pretty certain that bloody sacrifices would not be renewed for the simple reason that mankind, according to

[1] Literally "rushing water."

[2] Jastrow, *Religion of Babylonia and Assyria*, p. 321.

[3] Jer. vi. 20; Hos. vi. 6; Ps. li. 16 and Ps. xl. 6.

the law of religious evolution, has outgrown the idea, and has reached a higher state of civilisation in which the efficacy of blood is no longer maintained.

Everywhere we notice a progress from human sacrifices to the immolation of animal substitutes, and finally the abandonment of bloody sacrifices of any kind. The law of evolution is the same throughout, but the idea that man's guilt is so great and divine mercy so dear, still lingers with Christianity, and while the practice of bloody sacrifices is abandoned, the underlying belief is still retained in the doctrine of the sacrificial significance of the death of Christ. The orthodox conception of Christ's crucifixion and vicarious atonement bears many striking similarities to the most prevalent religious notions among the inhabitants not only of the Orient, but also of India and America.

Élie Reclus, in his interesting book, *Primitive Folk*, which is one of the best of basic treatises on comparative ethnology, speaks of religion among primitive people, saying:

"Sacrifice, under its varied forms, in its manifold acceptations, sacrifice is the fundamental doctrine of religion!"

Among all savages, the motto is, he says, "Slay! Slay!" for blood is made to propitiate the gods, to satisfy their demands, to gain their favors. M. Reclus continues (p. 304–305):

"Blood, the element pre-eminently plastic, the constituent principle of nutritive milk and generative sperm, blood was looked upon as the very soul of living organisms. But there is blood and blood; the blood of man was held most precious of all, richest in force and vitality. It was believed that water was concentrated in blood, especially in human blood, which could sublimate itself into divine blood Blood, they said, conserved life throughout nature, even in plants and in spirits. Blood was shed to the Manes to restore their intelligence and sensibility, was served out to the Olympians to keep them in health and vigor, and to the earth, genetrix of harvests, to fertilise her."

As an instance representing human sacrifice, M. Reclus speaks of the Khond tribe in a remote corner of India, who have but a short time ago compromised with the progressive spirit of the age, represented by the British invaders, and have substituted animals for their human victims. M. Reclus describes their cruel religious custom as follows (pp. 305–307):

"The Khonds, a tribe forgotten behind their ramparts of forest and marsh, have preserved in its primitive integrity the ancient belief, according to which the most potent virtue resides in blood given without repugnance or regret. They believe that no act is more meritorious than to immolate oneself for the benefit of the community. Nevertheless such acts of devotion have always been rare,.... and the Khond even prefers to sacrifice the life of others rather than his own; his fellow-citizens still praise his generosity when he buys human creatures wherewith to regale the gods. He who desires to make himself popular and deserve the favor of heaven, announces that on such a day he will have one or several victims butchered....Theoretically male sufferers are preferred to female, and the more beautiful those presented, the more costly the offering....

"No victim could be sacrificed if his price had not been liquidated in full. This condition was indispensable. The liturgy insisted upon the fact that there was no sin in slaying the man, provided he had been bought for ready money."

There is no need of entering into details as to how the Khonds treated their victims with great consideration. The person to be sacrificed, the "meriah" or "poussiah," is regarded as the incarnation of the god or goddess in whose honor the feast is given. After having enjoyed a good time, the victim is decorated, tied to a May-pole, covered with flowers, and slaughtered or killed in some way or other as an offering of vicarious atonement. M. Reclus describes a sacrifice in which the officiating priest explains the ceremony on ancient mythological grounds, that blood was needed to give stability to the earth, and that human blood must be spilled to propitiate the gods. It is not sufficient to have the sacrifice performed once, it must be continually repeated. A page in the liturgy, addressed to the goddess Pennou, runs thus (p. 317):

"If we immolate thee once for all, the virtue of thy sacrifice will grow weaker day by day. It will be better to sacrifice thee every year, and each time that there shall be need. For this cause, O Pennou shalt thou enter into the bodies of meriahs at the season of seed-time, or when evil spirits shall lay waste the earth, puffing forth the empoisoned winds of drought, the miasms of sterility and pestilence. Then shalt thou be sacrificed for the good of all."

The liturgy ends with a prayer which, according to Élie Reclus, is addressed to the goddess incarnated in the meriah, as follows (p. 319):

"'All living things suffer, and thou, wouldest thou be exempt from the common anguish? Know that blood is needful to give life to the world, and to the

gods; blood to sustain the whole creation and to perpetuate the species. Were not blood spilt, neither peoples nor nations nor kingdoms could remain in existence. Thy blood poured forth, O Meriah! will slake the thirst of the earth; she will be animated with fresh vigor. In thee has Pennou been born again to suffer; but thou, Goddess in thy turn, shalt be born again into her glory. Then, Meriah, remember thy Khond people, remember the village where we reared thee, where we cared for thee! O Tari Meriah! deliver us from the tiger, deliver us from the snake! O Pennou Meriah! grant that which our soul desireth!" (P. 321.)

M. Reclus adds:

"Our ancestors, the Kelts also had their meriahs; they bought slaves, treated them liberally, and when the year had run its course, led them with great pomp to the sacrifice. Each twelve months the Scythian tribe of the Albanes fattened a hetaira and killed her with spear thrusts before the altar of Artemis.[1] When the fitting moment returned, hierodules, who had been fed with dainty meats, were sacrificed to the Syrian Goddess. 'The spirits of the earth thirst for blood,' said Athenagorus. At the Thargelia, the Athenians splendidly adorned a man and woman, who had been entertained at the expense of the State, and led them forth in procession to be burnt at the confines of the open country. At the festivals of Patræ in Achia, wild beasts were thrown upon a flaming pile; amongst the Tyrians, sheep and goats; the worship of Demeter and that of Moloch are scarcely distinguishable from each other."

No doubt the Semitic nations clung to human sacrifice longer than others, and the passage of Silius Italicus in his poem *Punica* is certainly based on fact, for it agrees with the Moloch worship as we know it otherwise, both from the Bible and Phœnician history. The lines run as follows:

"Mos fuit in populis, quos condidit advena Dido,
Poscere caede Deos veniam, ac flagrantibus aris,
Infadum dictu, parvos imponere natos;
Urna reducebat miserandos annua casus!"[2]

This means:

"There was a custom among the people whom Dido on her arrival settled [in the city of Carthage] to ask the gods for forgiveness by means of murder, and to place upon the burning altar (it is horrible to relate!) little children, and the yearly lottery repeated these horrible events."

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[1] Strabo.

[2] Silius Italicus, *Punica*. Cf. the statements of Thomas Herbert; Paul Lucas, *Voyage au Levant*; Pietro della Valle, *Viaggi*.

How deep-seated is man's consciousness of guilt and his yearning for a remission of his sins! And if we consider that the ideas of expiation by blood and vicarious atonement, still prevalent among savage peoples and traceable among the traditions of the Orient, were very common in the days of the first century of the Christian era, we can appreciate how the Gospel account dwells with great emphasis on certain features in the report of Chrrist's death. We learn that Christ was sold and paid for (just as the Meriah among the Khonds had to be), that his death was voluntary and that he freely consented to die for mankind; (his withdrawal from Jerusalem for the sake of hiding on the Mount of Olives is obviously obliterated), further even the need of a repetition of the sacrifice is insisted on in the Roman Catholic Church by an interpretation of the Mass as a renewal of Christ's sacrificial death, which we must understand involves the continued passion of the Saviour. There is a continued need of redemption. Mankind continues to commit sin and still deserves the wrath of God; thus necessitating the continuation of the sacrifice of vicarious atonement that takes away the sin of the world.

What a comfort it was to the pagan mind that his guilt could be washed away with the blood of a sacrifice by vicarious atonement; what a consolation it was to a bereaved family to know that the fate of the deceased was determined by divine interference, by a god who lived as a man among men, that Osiris, or Bel Marduk, or Thammuz, or Ishtar, or Orpheus, had passed through the same ordeal, had descended into the domain of death and thence returned safely, that thereby the way had been prepared and resurrection or immortality in some form or other was assured. And so the hope of the Christian is based upon the innocent death of Jesus who was offered up for sinful mankind on the cross. How similar are the underlying ideas; yet here is the great progress of Christianity over paganism. The old idea of sin and atonement by blood remains the same, but Christianity abolished for good any further sacrifices on the ground that Christ's sacrifice was sufficient for all times to come, and the condition by which alone we can

partake of the blessings is repentance of our sins and a renewal of our heart.

CONCLUSION.

When we interpret the rites of savage sacrifices in the light of Christian dogmas, we shall better appreciate the sentiments of those poor deluded pagans, who by the shedding of blood, even of human blood, expected or still expect to gain salvation. Certainly they are mistaken in their religion, but subjectively considered, they are as honest and serious in their faith as are the Christians in theirs. They believe in the efficacy of blood and vicarious atonement, and they live up to their conviction according to the letter. The underlying system is the same in both paganism and Christianity. Both, pagan sacrifices and the Christian dogma of Christ's death on the cross for the remission of sin, are based upon the ideas of the efficacy of blood and vicarious atonement, a theory which is deeply rooted in the history of our race. In both, paganism and Christianity, it is based upon tradition and sanctified by long usage from generation to generation. In both it is vouched for by inspired prophets as a divine revelation. It is a mysterious echo of man's misinterpreted longings for deliverance from evil, a relic of the childhood of our race, a wrong answer to the questions of an anxious heart, yet at the same time it indicates the rise of religious ideals that at bottom are noble and elevating, a yearning for purity from sin, for peace of soul and the blessings of a good conscience.

The rapid growth of Christianity is easily explained if we consider that the fundamental ideas, the belief in resurrection, and immortality, in a God-man as our saviour, and in a vicarious atonement of blood were commonly accepted among all the nations of the Roman empire. The old religions had broken down; the old myths had become fables; yet the old religious yearning still remained and found a new setting in the touching story of Jesus of Nazareth. The old legends were too closely connected with polytheism; the Gospels had grown up on the Jewish soil of a rigorous monotheism, and when thus the old Gentile ideas appeared in

their new form, they appealed at once to the hearts of the people as a new and a true divine revelation.

St. Augustine meant what he said when he declared that Christianity is a most ancient institution of the human race, that only the name is new, for it was called Christianity only since Christ appeared in the flesh.[1]

Christianity accordingly can rightly be regarded as the fulfilment of the religious yearnings of the Gentiles. The elements of the Christian faith were believed in by almost all of the nations. That the external forms of the Roman Catholic ritual, the use of candles, sacred water, rosaries, etc., the reading of masses for the benefit of the dead, processions, responsaries, hymns, etc., are practically the same as the ceremonies of pagan religions is interesting but not important. The main thing remains, that the essential doctrines are not Jewish but Gentile, hence the animosity of the Jews against the Christians, and the Christians against the Jews, is ultimately based upon an instinctive recognition of a deep difference. The Nazarenes were not yet true Christians, nor did they ever flourish. They were heretics in the opinion of both Jews and and Christians; and Jerome (in his epistle to Augustine, 79) says of them): "Desiring to be both Jews and Christians, they were neither the one nor the other." According to Epiphanius (*Pan.* XXIX., 7) they were neither more nor less than Jews pure and simple, but they recognised the new covenant as well as the old, believed in one God and in Jesus Christ.[2] Being too Jewish in their habits and having not accepted the general traits and beliefs which characterise the Gentiles, the Church never recognised them as orthodox Christians.

If we ask who prepared this combination of Judaism with an idealised conception of Gentile notions, there can be but one answer: it was St. Paul. St. Paul was born at Tarsus of orthodox Jewish parents. Living in the diaspora among Gentiles, he imbibed

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[1] Ipsa res quae nunc Christiana religio nuncupatur, erat apud antiquos nec defuit ab initio generis humani, quousque ipse Christus veniret in carne, unde vera religio quae jam erat, coepit appellari Christiana." *Retr.*, I., 13.

[2] *Enc. Brit.*, Vol. XVII., p. 302.

from his early childhood Gentile ideas which in the development of his life appear precipitated upon his Pharsaic philosophy. His conception of Christianity was gradually matured and he passed through a complicated process of religious growth. He showed his zeal in the persecution of the Nazarenes, and when he witnessed the enthusiasm of this new sect he became converted to a belief in the crucified and resurrected Christ, in the vicarious atonement of Christ's blood and the fulfilment of all religious hopes of mankind in him, the unique incarnation of God.

In recognising that these elements of Christianity possess a close kinship to pagan beliefs, we do not mean to degrade Christianity but rather to recognise the relative dignity of paganism as a stage in the development of Christianity. We are apt to judge the Gentiles after the fashion of the ancient Jews, as idolators and children of wickedness. We are inclined to condemn their superstitions, and to brand their idolatry; and of course, if we are severe we are entitled to do so, but we ought to say that they cherished fundamentally the same ideals, and although Christianity ranges higher, being greatly purified, we should not be blind to the fact that pagans in their errors were not less serious, were not less devout, were not less religious than the Israelites or Christians. Human sacrifices are unquestionably a grievous mistake of the human mind, but we should know that wherever and whenever Gentiles fall into this gross aberration, they are only misguided. Their motives are ultimately as religious as was Jepthah's when he offered his daughter to the God of Israel.

While we recognise that pagan devotion is or may be just as fervid as Christian devotion, and that there is much in common between these two successive stages of religious development, we must at the same time understand that Christianity being the fulfilment of the religious development at a certain period of humanity is not as yet, as it appeared at that time, the realisation of absolute truth but only the solution of the problem as it recommended itself at that period. It was not as yet the final realisation of universal truth and it contains still many notions which are still pagan, that is to say, immature, erroneous, superstitious. And in

truth Christianity has not remained stationary; it developed higher and nobler conceptions, discarding the childish notions of mediævalism. Nor is the religious evolution of mankind as yet at an end. New vistas open before our eyes and there are still higher goals that must and will be attained.

Religious institutions are and have always been over-conservative. They cling to the letter of a dogma, they retain the traditional form of vestments, they use for sacrificial meals the primitive food or drink, and cling to the old conceptions even though they may have become antiquated, simply because all these things have become sanctified by sacred usage. In the beginning of the Christian era and during the growth of Christianity, however, the leaders of the Church were bold: while they unconsciously retained traditional ideas which had become part of their very souls, they were iconoclastic in rejecting the forms of paganism and, at the same time, they were bold as well as positive in their constructive work. Thus it happened that the most powerful leaders who by their influence, oratory, and impressive personality swayed the majority of bishops in the oecumenical councils, as innovators, reformers, and organisers are apt to do, formulated the theology of the new religion in very emphatic terms condemning every one that did not subscribe to the dogmas as they formulated it.[1] No doubt they did great service for the cause of religion, but we are apt to overrate the significance of their work. They have passed away and are now sainted in the memory of later generations, but if we could rouse them from their graves, they themselves would have modified their views if they could have revised them in the new light that in the course of human development throughout the intervening centuries had come to them; they would in the present age have expressed themselves differently. Their credos are the interpretation of Christianity from their own standpoint as seen in the light they had at that age; but it is our duty, the duty of the present generation, to work out our own salvation, and these sainted leaders of past ages would, if we could call them back and imbue them

[1] Hence the expression "*Qui cunque vult salvus esse*," the opening words of the Athanasian creed.

with the results of our more advanced science, justify our course of action.

Listen to St. Anselm whose writings have been accepted by the Church as an authority that is regarded as canonical or indeed little short of infallible. He says concerning his exposition *Cur Deus Homo:*

"It is not to be received with any further confidence than as so appearing *to me for the time*, until God in some way make a clearer revelation to me."

The clearer revelation has come in the development of modern science, astronomy, physics, physiology, psychology, anthropology, text criticism, and above all a clearer philosophical conception of the universe. While we may remain conservative in letting the old dogmas stand as the interpretations of religion, held by the leading men of past ages, and while we may preserve the continuity of Church traditions, we are yet free to infuse new life into our Church institutions by giving them a new interpretation such as is warranted by the maturest science of to-day. For science in its unequivocal and definite results is as truly and surely a divine revelation as the voice of conscience in a pure-hearted soul, and indeed it is superior and more reliable than the verdicts of oecumenical councils, the opinions of Church-fathers, and bishops, and archbishops, and popes, and even of the prophets and apostles whose revelations were mostly in dreams and visions and ecstacies.

The practical problem for our Christian Churches of the present century will be whether or not they can adapt themselves to the new conditions. Will they exclude the new light that science sheds on the religious problem, or will then open their doors and windows to let the rays of truth in. The probability is that most of our Churches will hail reform and will, as soon as they see their way, adapt themselves to the new conditions. They will broaden more and more until they have actualised the new ideals. Instead of being a brake on the wheel of progress, they can become leaders of people in the new dispensation that is dawning now upon mankind.

EDITOR.

BOOK REVIEWS.

Eleusinia. De quelques problèmes relatifs aux Mystères d'Eleusis. Par le Comte *Goblet d'Alviella*, Professeur a l'Université de Bruxelles, Membre du Sénat et de l'Académie Royale de Belgique. Paris: Ernest Leroux. 1903. Pp., viii, 154.

Count Goblet d'Alviella, well known in the literary world as an anthropologist and historian, sketches in an interesting pamphlet of about 150 pages the significance of the Eleusinian Mysteries. He describes the initiation as it took place in the first century of our era (Chapter I.); investigates the origin of the grand mysteries (Chapt. II.); explains the eschatology of the rite, the descent to Hades, and the belief in a future life (Chapt. III.); points out the changes which the mysteries of Orphism, the belief in the Dionysus Zagreus and the philosophy of time made upon the traditional festival of Demeter and Kore (Chapt. IV.); and finally the survival of the Mysteries, albeit in a changed form, in Gnosticism and Christianity.

Alviella distinguishes seven epochs in the history of Eleusinian Mysteries:

(1) The prehistoric times when families of the village Eleusis, devotees of the goddess Demeter and her daughter, Kore, practised magical rites for the sake of invoking the divine blessing upon their crops.

(2) After the annexation of Eleusis to Athens, outsiders were admitted to the ceremony. Their initiation was assumed to renew the life of the neophyte, and comprised a descent to the other world. In this stage the mystic drama forms an important part of the traditional rites.

(3) In the eighth century before our era, the main aim of the ceremony is sought in the regeneration of the initiated persons, and the main use of the Mysteries is expected to be attained in their beneficent influence upon man's life after death.

(4) The next period is characterised by a development of the ceremonial which is now divided into the greater and smaller mysteries.

(5) A new epoch beginning with the fifth century B. C. witnesses the addition of the Epopty, the sacred vision, a rite which is superimposed upon the traditional ceremonies, embodying a deeper conception of the soul, such as was taught by the priests of Orpheus, containing a cosmogonic system and ethical doctrines. Henceforth Dionysus plays a most prominent part in the Mysteries.

(6) A general syncretism characterises the sixth period in which the light of paganism flickers up for the last time, finally meeting its doom.

(7) The last period witnesses the rise of Christianity. Certain forms of the mysteries are transmitted to the new faith, and thus some of the Eleusinian ceremonies are perpetuated in the rituals of the victorious Church. P. C.

THE STUDY OF RELIGION. By *Morris Jastrow, Jun., Ph. D.*, Professor in the University of Pennsylvania. London: The Walter Scott Publishing Co., Ltd.; New York: Charles Scribner's Sons. 1902. Pages, xi, 451.

Morris Jastrow, Professor in the University of Pennsylvania, well known through his works on Assyriology and the religion of the Assyrians, presents the public with a stately volume of 451 pages on *The Study of Religion*, in which he employs throughout the historical method, beginning with a delineation of the history of the study of religion itself. He shows in the first chapter how utterly lacking the ancients were in their appreciation of the religion of others; for instance, Tacitus cannot learn anything from the religion of the Germans who to him are barbarians, and Lucretius sees the sublime monotheism of the Jews merely in the light of a superstition. The introduction of Christianity changed the situation by replacing the standpoint of indifference for one of onesidedness. One religion was regarded as absolute truth, all the others as mere idolatries, and here we have "the glaring inconsistency of a religion preaching love, and everlastingly brandishing the sword." Even a man like Voltaire saw in Mohammed merely "a deceiver and a monster of cruelty," and to Luther, the Pope and the Turk in their position represented Antichrist. Spinoza was the first to appreciate the historical development of religion. In his *Tractatus Theologico-Politicus* he makes an attempt to show how "certain leading principles....passing on from age to age, are modified and elaborated until they reach their culmination in Christianity." Spinoza, however, knows nothing as yet of other religions, and has as yet to hear of Buddhism and Zoroastrianism, and thus the historical attitude is still lacking in the comparative method. Broader tendencies were introduced by Alexander Ross, who published his work on *The Religions of the World*, in 1653, and by Picart and Bernard, whose illustrated work on the *Ceremonies and Religious Customs of the World* tried to be fair toward non-Christians. Bernard shows "a marked desire to be accurate in the information he furnishes, and has recourse to the best sources at his disposal." The progress is now rapid, and we may mention next in order Herder in his *Ideas for a Philosophy of the History of Mankind*. He sees in the religious development a great "movement forward and upwards....the golden chain of culture." "Since I have come to recognise thee, Oh golden chain of culture," he exclaims in a noble, albeit sentimental outburst, "that encirclest the world, and reachest out through all individuals to the throne of Providence.... history has ceased to be to me a horrible spectre of devastation on holy ground." Herder is an exponent of his time. His contemporary, Lessing, whose "Nathan

the Wise" contains the famous parable of the three rings, is no less significant. Still they all share with Samuel Reimarus, the author of *Wolfenbütteler Fragmente*, "a strong feeling of hostility towards priests and the clergy in general." The scope widens in Hegel, and becomes truly historical when we come down to the present age, when the late F. Max Müller of Oxford is mentioned, C. P. Tiele of Leyden, Ernest Renan, Albert Réville of Paris, E. B. Tylor of Oxford, and many more, nor does our author overlook the influence of museums, among which the Musée Guimet is specially mentioned.

In the second chapter, on *The Classification of Religions*, Professor Jastrow makes an incidental remark when speaking on Monotheism and Henotheism: "The popular notion which makes the Hebrews the originators of monotheism is erroneous. The distinctive contribution of the Hebrews to religion is not the belief in one God, but the investing of that God with ethical attributes which separated him gradually from the deities in which the other nations believed, and eventually brought about his triumphant survival in the great crash which befell the ancient world and swept away the faiths of Egypt, Babylonia, Phœnicia, Greece, and Rome." (Pp. 77–78.)

"Among the Hebrews, the prophetical movement of the eighth century definitely gave an ethical flavor to the conception of the national deity, and thus paved the way for a distinctive form of monotheism." (P. 79.) While entering into the classification of others, among whom Eduard v. Hartmann and Raoul de la Grasserie are specially discussed, Professor Jastrow states his own views as follows (p. 117):

"The classification which we would thus propose for religion is fourfold, corresponding to four stages of intellectual culture and moral development:

"1. The Religions of Savages.

"2. The Religions of Primitive Culture.

"3. The Religions of Advanced Culture.

"4. The Religions which emphasise as an ideal the coextensiveness of religion with life, and which aim at a consistent accord between religious doctrine and religious practice."

In the descriptions of the character and definitions of religion, our author goes over the field from Cicero to Tiele, discussing the philosophy of fear as the cause of religion, proposed by the ancient ones and held by more modern authors like Hobbes. He quotes Cicero's definition from "*re*-legere," and that of Lactantius from "*re*-ligare," the latter having been accepted throughout the Middle Ages through the influence of Augustine. He discusses the religion of rationalism of the deists and rationalists of the eighteenth century, a movement which culminated in Kant. As to *The Origin of Religion* (Chapt. IV.) we are again specially referred to F. Max Müller, Tiele, and Réville. Spencer's proposition to trace religion to ancestor-worship and the theory of totemism is regarded as insufficient, and it

seems that our author is inclined to accept Prof. Max Müller's theory of religion (pp. 195, 197–198):

"In this theory of the origin of religion there are involved three factors: (1) the desire to satisfy one's wishes, irrespective of the fact whether this desire is looked upon as the ambition to attain the goal of human life, or as a hopeless longing for unrealisable happiness; (2) the impulse to seek external help in overcoming obstacles or in avoiding dangers; (3) the spiritual influence of the perception of the Infinite, involving the idealisation of the powers of nature, and furnishing man with a thought capable of exercising a lasting influence upon him and of stirring the emotional side of his being.

"The religious instinct, aroused by the perception of the Infinite, abides amidst all changes in the kaleidoscope of mankind's history. It is a permanent element in the chequered career of humanity,—in a certain sense, indeed, the only permanent element."

The second part of the book (Chapters V. to XI.) is devoted to special aspects treated: first, the factors involved in the study of religion; secondly, religion and ethics; thirdly, religion and philosophy, religion and mythology, religion and psychology, religion and history, religion and culture. In all of them the modern scientific standpoint is taken, especially so in the discussion of psychology, where the new psychology is relied upon and where Professor Jastrow finds one of his sources, Eduard v. Hartmann, lacking and replaces him by Professor Starbuck, relying on his book *The Psychology of Religion*, 1899.

The third and last part is devoted to the practical aspects of the study of religion and the teaching of the history of religion. Chapter XII. recommends strongly the sympathetic attitude to be taken as the only one that is fair and which will prove at the same time successful. Our author then passes in review the study of the sources of the historical study of religion: the colleges, universities, seminaries and generally the museums as an aid to the study of religion. Here again he calls attention to the Musée Guimet. Emile Guimet's entire life has been devoted to a single purpose, the furtherance of research into religious history. His own personal interest lay in the religions of China and Japan, by reason of which the collection is somewhat onesided. In the Musée Guimet the classification is geographical, but Professor Jastrow proposes as a more scientific plan to place religions in groups according to a scheme of classification which might be: first, the religions of savages; second, of primitive culture; third, of advanced culture; and, finally, all those that emphasise the coextensiveness of religion with life. Further, the visitor should be enabled to follow with ease the plan of religious development underlying the arrangements. "A prominent feature in each section would be a large map, or series of maps, illustrating the distribution of the religions belonging to the group....The objects collected will serve as illustrations of the traits and features, as well as the objects used in the cults, models of primitive altars and temples, images of the gods and spirits worshipped, and either models or photo-

graphs illustrative of religious worship, of religious dances and processions, of incantations and magic ceremonies, as well as of marriage and burial customs. Particular stress should be laid upon the latter, as furnishing in most instances a key to the most significant of a people's religious beliefs."

Professor Jastrow further insists: "The museum of religious history would form a bond between the public and the investigators. It would be the means of rendering generally accessible the results of research; and, in return, the consciousness of thus directly contributing towards the education and liberalising of the masses will give the scholar that courage and cheer which constitutes the chief reward of his labors." R

L'IDÉE D'ÉVOLUTION DANS LA NATURE ET L'HISTOIRE. Par *Gaston Richard*, Agrégé de philosophie, docteur ès lettres, chargé du cours de sociologie à l'Université de Bordeaux. Paris: Félix Alcan. 1903. Pages, iv, 406. Price, 7 fr. 50.

M. Gaston Richard presented this book under the form of a memoir to the French Academy of the Moral and Political Sciences, which awarded him the prize "*Crouzet*" in the year 1901. It is here republished in book form, embodying only such additional observations as were written by the author in reply to M. Theodule Ribot's references to the book in his capacity as President of the Academy at the meeting, October, 26, 1901.

We are informed by the author that "the idea of evolution may be considered as the summary of a doctrine which formulates the law of the origin and of the development of the world, as the directing principle of a method which should lay the basis of a cosmogony. But a discussion of the doctrine of evolution should be preceded by a study of the relation between the idea of evolution and the method which applies to the origin of the great processes into which the whole world may be analysed. This problem of method should take precedence over the question of the doctrine itself. The critical philosophy and the philosophy of the sciences divide themselves in the work of a study of the idea of evolution in both nature and history, but the critical philosophy will have to pronounce the final verdict." It is to the examination of this law that Monsieur Gaston Richard has devoted his book, which has been introduced by so high an authority as the French Academy.

The first part starts with a consideration of "simple evolution" and of "complex evolution"; it discusses the origin of the earth and the origin of organic life, organisation and vitalism, including a discussion of transformism. Next in question is the problem of adaptation, the origin of the brain, the cerebral functions, and generally the law of retrogression compared with the law of adaptation.

While the first part is devoted to biological problems, the second part discusses evolution in the domains of psychology and sociology. The nature of accident in history is set forth and the fact itself as such eliminated. With the historical method, a social psychology is established in which the unconscious plays an important part, while sociality is pointed out as the factor that produces rational be-

ings. The concrete data of social psychology are enumerated, and the significance of instinct is insisted on. The law of the division of labor is introduced, and finally a parallel is drawn between social retrogression and biological retrogression.

The third part discusses consciousness, and the part which it plays in the gradual development of life. For the appendices, some topics are reserved which did not find room in the body of the book: A Discussion of the Genetic Method and Teleology, Segregation and the Geography of Zoölogy, The Brain of Woman and the Theory of Selection, The Science of Historical Criticism After the Criticists' School, The History of Sects and Social Psychology, The Law of Localisation and Survival in the Division of Social Labor, Judiciary Discussion and Progress of the Law, and finally, The Rôle of the Malcontent and the Utopian Imagination. Σ.

MORALE. Essai sur les principes théoriques et leur application aux circonstances particulières de la vie. Par le *Dr. Harald Höffding*, Professeur à l'Université de Copenhague. Traduit d'après la deuxième édition allemande par *Léon Poitevin*, Professeur de philosophie au collège de Menton. Paris: C. Reinwald. 1903. Pages, xv, 578. Price, 10 fr.

We have discussed Dr. Harald Höffding's work on ethics in *The Monist* for October, 1890, Vol. I., No. 1, p. 139 ff., and need not enter into a detailed exposition of his theories, especially as no essential changes of the contents have been made in the French translation which has been made with great fidelity to the original, and, as it seems, under the superintendence of Dr. H. Höffding himself. It has been amplified only by articles of the author which appeared in the *International Journal of Ethics*, in *The Monist*, in *Ethical Investigations*, and other publications, all of which are written from the original standpoint of Professor Höffding. The book contains a thorough review of the principles of morality, individual as well as social, including family life, education, philanthropy, and politics. A good index is attached to the book. ρ.

EINLEITUNG IN DIE PHILOSOPHIE, Von *Hans Cornelius*. Leipzig: B. G. Teubner. 1903. Pages, xiv, 357.

Cornelius lays down in the present volume his views of philosophy under the title of "Introduction Into Philosophy." Philosophy according to him is due to the aspiration for clearness. He analyses "the mechanism of thought" of its "equilibrium" upset by doubt in our search for cognition. Philosophy in distinction from other provinces of thought is an explanation for *final* clearness, that is clearness as to final questions, the demand of a philosophical inquisition for our longing for a unitary explanation of the entirety of the world. This is practically all that is meant by metaphysics, but it is necessary for us to investigate the nature of the materials from which we construct our "world-conception" and also the methods. The latter is called "Epistemology." Most of the failures of philosophy are due to the lack of a proper analysis of comprehension.

Cornelius passes in review, the several philosophical conceptions, first, the natural picture of the world, body and spirit, the ego and our fellow beings, the desire for cognition, the unscientific explanations, the question of causality.

Our author then continues to investigate the scientific methods of dogmatism, the nature of hypotheses, and knowledge as a picture of reality. Here he falls back on Mach and Kirchhoff, who regard knowledge as a reconstruction of facts. The ultimate aim of philosophy consists in finding the psychological foundations of epistemology, a reconstruction of the development of pre-scientific notions and an epistemological solution of the metaphysical problems. In the first part of the special argument, Cornelius discusses the metaphysical phases of dualism, idealism, materialism, sensualism in ethics, eudemonism, utilitarianism, etc., etc., coming down to an explanation why consequent scepticism is impossible.

The second part treats of the epistemological phase of philosophy. Cornelius analyses the elements of experience, explains the doctrine of the association-psychology, criticising its atomistic tendency for overlooking the factor of connection in experience, and enters into the details of Kant's categories, paying special attention to the law of causation and its universality and necessity in spite of its subjective source.

The concluding chapters touch on the belief of immortality, which according to our author lies beyond the province of scientific inquiry, on the antinomies, the latter being illegitimate problems, and the notion of value (*Wert Begriff*), which depends upon the nature of our personality. He concludes with an appreciation of the two determinants of the will, happiness and fear, the former Eudemonistic and the latter Timetic, bringing out the demand of self-education. Σ

ESSAI SUR LA PSYCHO-PHYSIOLOGIE DES MONSTRES HUMAINS. Un anencéphale—un xiphopage. Par *N. Vaschide*, Chef des Travaux du Laboratoire de Psychologie expérimentale de l'École des Hautes-Études (Asile de Villejuif), et *Cl. Vurpas*, Interne des Asiles de la Seine (Asile de Villejuif). Paris: F. R. de Rudeval. 1892. Pages, 287.

France seems to be the country which contributes most to the solution of the psychological problem; M. Ribot has condensed the psychology of double personality, of the diseases of the will, and other valuable topics; M. Richet has studied the psychology of micro-organisms, and also the phenomena of telepathy and kindred subjects, and now the Doctors, N. Vaschide and Cl. Vurpas, present us with an interesting essay on the psycho-physiology of human monsters, devoting the one half of their investigations to a brainless creature, the other half to xiphopagous twins. The first case is a sad production of a brute formation in human form, which, however, gives us important information on several problems of the nervous anatomy of the human system, a condition which justifies our authors to speak of it as *ce cas heureux*, "this happy instance" being a rare case from which we can derive important information.

Nothing could be said about the mental life of the monster, for there is none. The individual under observation used to show its displeasure by ejecting cries which were sometimes sharp, feeble, rather prolonged, monotonous, now spontaneous, and now expressions of resentment made in response to disagreeable impressions. The case in question which has been studied in the living individual as well as the post-mortem obduction, proves that the cerebral hemispheres, which were utterly missing cannot be the seat of pain or of the feeling of temperature, or of other well co-ordinated reactions, which are sometimes regarded as having their seat in the cortex. All these phenomena are purely physiological, and have their seat in the lower regions, viz., the upper portions of the medulla.

The cerebrum, which for all mental activity is the most important organ, is after all dispensable for the purely physical, the barely psychological and biological life. It must be regarded as the organ of co-ordination between the higher psychodynamic and properly mental activities, but life and even sentiency can be maintained without it.

Less unpleasant than the study of the anencephalic monster is the exposition of the biology and the psychology of xiphopagous twins. Our authors pass in review two special cases which came under their observation, viz.: a description of Chinese twins called Liou Tang Sen and Liou Seng Sen; and the Hindu twins, the sisters Radica and Doodica. In addition they give a summary of similar cases, among them the Siamese twins and the sisters Rita-Christina, animal monsters, a man with a double head, etc. Close observation of the Chinese twins proves that in their psychical life, one was superior to the other, being the initiator of most actions. As a rule they went to sleep at the same time, but not always, a fact which proves that the chemical theory of sleep is not tenable. The case of Radica and Doodica is more interesting because for the sake of saving the life of one, they had to be separated by an operation. The weaker one, Doodica, died after the operation, the cause of death being peritoneal tuberculosis. The operation was made just in time to save the life of Radica.

The operation was not without difficulty and revealed a very strange state of affairs. There were three great arteries communicating between the twins. Radica drew constantly and daily upon the blood of Doodica, giving back venous blood, an inequality which in the long run could only be detrimental for both. Radica was the stronger one and she was upon the whole of better temperament. Doodica used to torment her twin sister constantly. The latter, however, showed a great patience and considerable endurance with the pranks of her twin sister.

The lessons of these strange cases as presented by our authors are very instructive, and must be studied by specialists in the original communications. Abhorrent though the subject naturally may be to the lay reader, we cannot help recognising the great significance which a close investigation of the physique as well as the psychology of monsters possess for the specialist, and we take pleasure

in calling attention to this unique work. The book is sufficiently illustrated with seventy photographs, plates, and diagrams in the text.

FRIEDRICH NIETZSCHE, SEIN LEBEN UND SEIN WERK. By *Raoul Richter*. Verlag der Dürr'schen Buchhandlung. Leipzig, 1903. Pages, vi, 288. Price, 4 Marks.

It is a sign of the times that a young *Privatdocent* in the University of Leipzig lectures on the philosophy of Nietzsche. Herr Raoul Richter is an enthusiastic admirer of this most modern thinker whom he regards, not as Nietzsche regarded himself as a Slav, but as a typical Teuton.

Herr Richter delineates in the first part the biography of Friedrich Nietzsche, the events in the life of the learner and then of the teacher, explaining his death and quoting the diagnosis of Dr. Moebius.

The most important part of the book is devoted to the work of Nietzsche in which Herr Richter condenses the several writings of his hero, adding to it his criticism and an appreciation of the significance of Nietzsche's philosophy in the history of mankind.

LES GRANDS PHILOSOPHES. ARISTOTE. Par *Clodius Piat*, Agrégé de philosophie, Docteur ès Lettres, professeur a l'école des carmes. Paris: Félix Alcan. 1903. Pages, viii, 396.

M. Clodius Piat, a French savant, convinced of the immortal merits of Aristotle has undertaken to write a monograph of the Aristotelian system, in which he sets forth in a systematic review, the doctrines of the great Stagirite thinker, making his work a welcome handbook for students, and bringing it up to date by comparing it with other systems, mainly that of St. Thomas Aquinas, who is of especial importance for Aristotle, because his interpretation of the Greek thinker was practically accepted throughout the Middle Ages as authentic, and the genuine Aristotle has only been recovered in the times of the Renaissance with the revival of classical studies and a renewed acquaintance with the Greek original.

Professor Piat has done his work well and English scholars who are in the same line would do well to take notice of the labors of their French colleague.